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Editorial Notes.

Mr. Ridley on Essentials for the Future.

In financial and commercial decisions in the gas industry, we cannot to-day rely solely upon experience for guidance. As a matter of fact, such experiences have become largely obsolete, for the standards upon which, and circumstances in which, they were obtained are no longer in existence. New circumstances, new standards, and an entirely new outlook have been fashioned; and we have to conform to their demands. If we do not, we shall simply be fabricating for ourselves a complexus of a most uncomfortable and retarding—perhaps destructive—order. An excellent review of the needs brought about by the altered circumstances in the industry is found in the comprehensive Presidential Address which Mr. T. P. Ridley, Secretary and Commercial Manager of the Newcastle and Gateshead Gas Company, delivered last Friday to the North of England Gas Managers' Association. With his ripe experience of the changed conditions of the industry, gained in a district in which the keenest competition demands the sharpest of wits, and in which there has been industrial depression for years past, the President takes his stand with those who hold that a revision of statutory powers in several ways is urgently needed, and that our trading practices of (say) only a few years ago are inadequate to the claims of business maintenance and maximum progress. And business maintenance is as important as progress, seeing that the latter has quantitative reduction to the extent of inability to retain business already possessed. The degree of revision must, of course, be reasonable; but reasonableness must not have applied to it an under-estimate or an excessive computation. But in it there must be vision—vision which enables us to fashion in our minds not only immediate conditions, but the probabilities of the future. And there is much material spread around which enables us to picture a new intensity of competition—in respect of not only our primary product, but our secondary ones. We have to meet that. How?

Mr. Ridley neither under-estimates nor makes excessive claim as to requirement. The case he presents supplies strong support for the legislative programme of the National Gas Council; the plea he makes for economy without sacrificing efficiency, and for efficiency in every part of our operations and on the part of every individual, is that of a sentient mind. We want the economy resulting from efficiency to enable the fresh spending which new conditions claim, in order that our position may not be affected financially, and so that we may continue to engage in business on the basis of the lowest attainable price for gas—the lowest having regard to the stability of the undertaking and the interests of the proprietors. Every part of the address is worth careful consideration. In the first place, we are invited to consider how the capacity for development of our industry is largely dependent upon its ability to raise capital cheaply. An enlightened Legislature ought not to maintain obstacles to this. It should be regarded by them as a duty to do everything possible to ensure that a public utility undertaking has the best possible opportunities for financing its business on the cheapest terms. Investors have regard to increased risk; and they measure risk by their worst experiences, which, in the case of the gas industry, were during and succeeding the war. The idea of increased risk for gas has also been engendered by the attitude of the Government towards electricity. There is no one specific for the cure of such impressions. The establishing of a minimum dividend in the sliding-scale will have some effect; but at the same time it will not give us all the cheap capital we require. Therefore the hall-mark of propriety is upon the suggestion which is being made in the scheme for new legislative power to increase the proportion of borrowing authorization to paid-up ordinary and preference capital, to remove the present restrictions as to the proportion of capital which can be raised by the issue of preference stock, to provide larger reserves, and to obtain greater latitude in issuing stock. The President is favourable to the quotation of stocks being at £1 instead of £100; and in all market dealings we are veering to the view that pricing on small units is more in accord with these times when we have to study matters from the popular standpoint. Even bankers are willing to accept £1 on deposit; and shares of a nominal value of one shilling are very much in favour. Stock Exchange authorities, too, should not overlook the fact that the gas industry caters for about 4·6 million prepayment consumers out of a total of about 8·5 millions; and therefore every facility and encouragement should be given to the small consumers to invest in the concerns which supply them with a daily necessary.

Among other topics dealt with by Mr. Ridley is the question of new methods of charging with the view of providing for overhead or service costs in a fixed primary sum, and so permitting a lower charge than is at present made per unit of consumption—thus giving the consumer greater liberty to increase his use of gas, which has the effect of gradually reducing the unit average of his total payment. Various systems are presented and discussed in the address, and argument is advanced in favour of a change. It is suggested by the President that the introduction of such systems here will probably create opposition from local authorities. Local authorities had better make sure of their ground. Many of them are utilizing the two-part tariff in connection with electricity

supply; and Parliament has given liberty to the Electricity Commissioners to change the old method of charge. There is also the experience of gas undertakings in America, and to a small extent in this country. Parliament cannot refuse to one public utility industry a condition which is found of so much advantage by another public utility industry; it is also part of its business to make adjustments which will establish equity in the place of inequity. In another direction improved facilities are required for effecting amalgamations of the smaller undertakings with the larger neighbouring and more economically operated ones. If, further, Parliament does not release gas undertakings from the injustice of the one-third purchase restriction in respect of residual products, they will be subscribing to the continuation of the principle of placing a barrier to the greatest efficiency being derived in a public utility undertaking, and that in the interests of unfettered private interests. Here, again, we have a change pointed out by the President. The Government are anxious that national economy shall be promoted by the most efficient use being made of our fuel resources. The gas industry is making considerable contribution to this by purchasing bye-product gas from the coking industry; but where this is done, the advantage is being in part discounted by the effect upon tar-distillation plant through inability to work it to its utmost capacity, and therefore efficiency, owing to the one-third limitation. The argument for release from a condition which ought never to have been established, has with time increased in strength.

There is much more that is excellent in the address which we can only mention, without discussion or accentuation, in order to direct attention to the subjects. There is strong advocacy by the President, based upon experience which has proved the effectiveness, of costing systems, of the economic value of machines in the clerical department, of the usefulness of an emergency and efficiency officer, and of the duty to organize with a view to eliminating waste. Mr. Ridley also presents the case in a nutshell for the development of the industrial load, which is a branch that requires specialized knowledge and therefore training. For this business there is great competition with oil for heating and electricity for power. In this relation, let us quote two statements from the address which are especially worthy of being borne in mind: "The cost of gas is usually the first considera-"tion of the industrial user. This will vary not only with "the price per therm, but with the efficiency of the ap-"paratus." The second one is: "We need to get at the "manufacturer's side, and show him where he can use "gas. We cannot afford to wait till he finds out, and "comes to ask for the apparatus."

The President does not eschew such polemical subjects as the sale or hire of gas apparatus and the making of monthly collections. Regarding the former, we would merely say the conditions of the people in most districts vary to such an extent that policy must be adapted to them, in order that gas undertakings may become universal providers of gas for all purposes to which it is applicable. A further topic is the shackling of our industries by undue rates and taxes, which has illustration on the North-East Coast. This shows how difficult—nay impossible—it is, working under such burdens, to compete on level terms with other countries. And yet our Government appears to think nothing of spending millions upon millions speculatively and compulsorily upon the reorganization of electricity generation in this country. Power represents a small percentage of the total of works costs; and it is not the diminution of that item for which industry is praying. What it wants is the reduction of taxes and rates. The Government complain of Poplar; Poplar is not without ground for complaining of the Government.

The address is strongly constructive, pointing, as it does, the needs of our old-established industry for changes in statutory power to meet the changes in condition which are already upon us, and others which are in process of development. These are matters of which our legislators should be made cognizant; and the more they know of them, the greater will be the backing when the Bill incorporating the scheme of the National Gas Council is taken before Parliament by the Board of Trade.

Census of the Gas Industry.

We are a little sceptical as to whether the Third Census of Production, which is based upon the year 1924, will give, in regard to values, any true reflection of progress or otherwise of some of our industries. At any rate, in the time to come, when students of the Third Census investigate the statistics relating to the gas industry, they must carefully take into account the bases on which they have been compiled, and must not overlook the differences in values which exist between the year of the second census (1907) and 1924. If there is not this consideration, there will be much misleading, inasmuch as the war entirely altered all value relativity. Everything in respect of production costs soared to great heights—materials, labour, and everything else;. and, consequently, the charges to the consumers of gas. As seen in the third table in the review of the 1924 Census, as published this week, the demand for the primary product of the industry went up magnificently during the period between that year and 1907. The increase in selling values, however, between the two years as shown in the first table is altogether out of harmony with the increase in demand. For example: In the third table we have a total make of gas of 276,406 million c.ft. in 1924, compared with 183,791 millions in 1907—an increase of rather more than 50 p.ct., while the selling value given in the first table is £46,164,000 in 1924, as compared with £22,441,000 in 1907—an increase of rather more than 105 p.ct. But if 50 p.ct. more business was being done, the balance of revenue from gas shows that the gas industry, having regard to the higher costs of materials and labour, was serving consumers with becoming modesty in respect of charges. Of course, the difference in demand between 1907 and 1924 has since made further enlargement. But the difference in selling value relative to business done has declined since 1924, if we except the temporary advance during, and immediately succeeding, the great coal stoppage. Another satisfactory feature about the Census is that, despite the higher prices charged for gas, the advance in consumption continued, which shows that the virtues of our primary commodity rose superior to its changed value per unit of heating potentiality.

In respect of gas production, the total figure for 1924 of 276,406 million c.ft. compares with 275,225·8 million c.ft. in the Board of Trade Return relating to gas undertakings—a difference of 1180 millions, which is due to the fact that the Census incorporates not only statutory but non-statutory undertakings, while the returns are limited to statutory concerns. It is further noted in the Census of Production figures that some of those relating to secondary products only include the portion of their output which is not subject to further treatment in the works in which they are made; but the quantities of products derived from the part that is treated are given. It would have simplified matters very much if the totals of the original products had been included, and then for these to have been supplemented by the figures as to the products realized from them, and by the quantities of untreated crude materials still remaining for disposal. This would have enabled a better view to be obtained as to the actual carbonization results, together with the extent of the manufacture of other products from the main secondary ones by the undertakings themselves.

It will also be observed in the second table that the coal gas made in 1924 is divided into three parts: (1) Coal gas of which the thermal value is known; (2) coal gas for which the calorific value was not obtainable; and (3) coal gas and water gas not separately distinguished. The portion of straight coal gas for which the calorific value was obtained amounted to 176,280 million c.ft., and the total calorific value is given as 890·23 million therms, which works out to 505 B.Th.U. per c.ft. This is rather higher than we should have expected the average to be, though knowing from the compilations of the National Gas Council the large proportion of the gas distributed in Great Britain which is declared and supplied at an actual value round about 500 B.Th.U. The coal gas and water gas not separately distinguished amounts to only 44 million c.ft., which, having regard to the large amount of steaming in continuous vertical retorts, we should say

is a figure upon which there can be little reliance. The thermal value of this item is given as 188,000 therms, which averages out to only 427 B.Th.U. per c.ft. There again we view the derived calorific value per c.ft. with some doubt as to its being fairly representative of steaming in continuous vertical retorts, unless, of course, the item is strictly confined to gas-works in which coal gas and water gas are mixed in the process of manufacture, prior to any determination being made of their relative calorific values.

Glancing at the final table, which summarizes some of the leading data from the Census of 1924 and 1907, and gives separate figures for gas companies and gas-supplying local authorities, it is remarked that the total value of "goods" made by the gas companies in 1924 was £42,571,000, and by local authorities £20,421,000—making together £62,992,000. To these figures, fitting and repairing meters, &c., is added. The item does not appear to be very clear. It would be better to have had an explanation of what the "&c." covers, in view of the fact that the fitting and repairing of meters does not seem to us to have much relation to the "value of goods made." However, the figure for both companies and local authorities for fitting and repairing of meters, &c., in 1924, was £1,232,000; making the total value of "output" in 1924 £64,224,000. The fitting and repairing of meters, &c., in 1907 amounted to £1,288,000, which made the total value of output £30,645,000—a difference in favour of 1924 of £33,579,000. Having arrived at this figure, we miss any reference to the costs incurred in producing the total value of output. Had the data been available, they would have been highly instructive as to the flights of expenses during and subsequent to the war, which have left us, due to the higher values of materials and labour, with a level of production and plant outlay (which may to-day be regarded as our new normal) much above that which ruled in pre-war days.

The next item in the last table in the review which arrests attention is the cost of new construction and repair work carried out in the two years. In 1924, the combined expenditures in respect of companies and local authorities amounted to £14,444,000, as compared with only £3,483,000 in 1907—a rise of £10,961,000 for 1924. The figures show how remarkably the work of the industry has increased in the past seventeen years; and this has had a tremendous effect upon the extent and character of the employment required by gas undertakings. But even if this is a notable indication of vitality and expansion of work in the industry (apart from its own internal manufacturing operations), another item—cost of materials used—is illustrative of the great expansion of work that the gas industry provides for other industries. In 1924, the companies and local authorities, according to the Census, spent £34,753,000 on materials, compared with £13,909,000 in 1907, which shows an increase between the two years of no less than £20,844,000. It is remarked in the review that the net output of the gas undertakings reached £29,471,000 in 1924, which sum represents the amount by which the total selling value of the output of gas and other products and of the work done for consumers on repayment (£64,224,000) exceeded the cost of materials purchased and used (£34,753,000). The internal employment by the gas industry has also been considerably increased, notwithstanding the introduction of mechanical operation for the more arduous parts of manufacture. The Census shows that the average number of persons employed in 1924 was 108,421, of whom 90,837 were operatives, and 17,584 were members of the managerial, technical, and clerical staffs. In 1907, the number of persons employed was 80,633, of whom 72,383 were wage earners, and 8250 salaried persons. It is interesting to remark that the highest number of operatives employed at gas-works at any one time during 1924 was 93,665 in December, and the lowest 88,498 in June, which is indicative of the growing ability of the industry to maintain employment in the summer months as compared with middle winter. Another interesting point is that in the figure of 108,421 for 1924, 2622 were females, while in the 80,633 for 1907, only 311 were females. One remarkable figure in this relation is that the net output per person employed (excluding the cost of construction and repair work done) was £272 in 1924, compared with £207 in 1907. The "remarkable" feature is (considering the differences in wages) that, to our minds, the £272 is low, although an improvement on 1907.

It can be said, in conclusion, that the record of the Census is highly satisfactory in respect of expansion, having regard to the circumstances which somewhat vitiate the comparative value of the data, and to which we called attention in the earlier part of this article.

Flueless Bedrooms.

The report which Prof. A. H. Barker submitted, at the recent annual conference of the British Commercial Gas Association, on the ventilation of small bedrooms may be taken as a ratification of already formed rational conclusions and a condemnation of irrational acts. The document is, so to speak, an interim one; seeing that a report in fuller detail is being prepared. This start on a new line of investigation has not been made before it was needed, for recent events in respect of the building of rooms without flues, and the substitution of totally inadequate means of effecting ventilation, have shown that indisputable guidance is pressingly required for architects and builders, housing authorities, and all who have power to insist on healthy conditions in dwellings.

With anyone who is entering upon scientific research into such a subject, we sympathize over the absence of definite standards or specifications as to what constitute good ventilation and atmospheric conditions in a room. But when an investigator of such resource as Prof. Barker takes in hand work of this kind, although standards of efficiency or sufficiency may not be available, we may rely upon his care producing results which, within the limits of the investigation, may be taken as perfectly sound. At the same time, Prof. Barker is of opinion that the experiments dealt with in this report should be repeated and extended, not because he has any doubt as to the results presented (under the conditions set forth) being definite, but because repetition in different circumstances would make them still more convincing, and their extension would be of inestimable value in the formulation of standards of ventilation and air conditions which would be protective of the health of the community, and would unquestionably produce a cessation once for all of the reactionary movement towards eliminating flues from bedrooms. Probably, when flues were first invented, the designers had only the single idea in mind of providing a means of escape for the products of combustion of solid fuel; appreciation came later as to their ventilating properties and contribution to the maintenance of air purity in living and sleeping rooms. It is found that they subscribe materially to the realization of our more modern knowledge that the true functions of ventilation are physical rather than chemical. The results of the experiments which Prof. Barker submits in his report satisfy us that the retention of a flue in a bedroom is an essential to the preservation of wholesome conditions, and that the abolition of a flue, while it may subscribe a modest economy to house construction, will at the same time contribute to a deterioration of healthful conditions.

Prof. Barker's experiments were carried out in a room in a working-class dwelling, in differing circumstances as to ventilation, in which three healthy young men slept every night. We do not envy them their experiences, including colds and headaches; but they have the satisfaction of knowing that they have helped to supplement the sum of knowledge on this particular question. The experiments were made in various ways—with the chimney flue and other direct means of ventilation closed; with the window slightly and widely open, and the flue still closed; with the flue open and the window closed; and with the flue and window both open. Also with a small ½-kw.h. electric fire and a small gas-fire regulated to give an equal heating effect. In every case, both in respect of carbon dioxide and humidity healthier conditions prevailed with the flue open. The interchange of air, using the gas-fire with the flue open and the window closed, was three to four times that with the electric fire in use, the flue closed, and the window open 3 in. The primary effect of the chimney flue is to increase greatly the rate of interchange of air in the room, as compared with the same conditions in which the flue is closed. With the flue closed, and the

windows open, and using an electric radiator equivalent to the gas-fire in heating effect, the room was distinctly stuffy. The best of all ventilation results is secured by the open chimney flue with a small gas-fire. Even with a closed window, nothing is to be feared from the condition of the air if there is a flue.

To get the full value of the results of these experiments, it is necessary to study the report which we publish *in extenso* in this issue. It leaves no room for doubt. We hope the lessons will have a salutary effect among those in authority who have allowed a retrograde movement to make some measure of headway. "Health First" should be their motto, and commercial interests should not be permitted to debar the application of the motto to practice.

Low-Temperature Carbonization and Town Gas Supply.

News of the largest adoption of low-temperature plant for town gas supply of which we have heard has reached us from a correspondent; and the very magnitude of the installation which is going to be made invests it with special interest as a notable event in the history of gas supply. The contract for this plant (the article in later columns shows) has been entered into by the Public Service Electric and Gas Company of New Jersey with the International Combustion Engineering Corporation of New York. The contract is for low-temperature carbonization plant with a throughput of 640 tons of coal per 24 hours. Our correspondent gives details of the contract and of the selected system. Here, however, we will merely refer to the capacity of the plant from the gas-making point of view. It is stated that, from the 640 tons of coal, the gas production will be from 2·5 million to 3 million c.ft. of 800 B.Th.U. gas. Taking the 3 million c.ft., and dividing it by 640 tons, we have a make of gas per ton of 4687 c.ft., which, at a calorific value of 800 B.Th.U., is equal, roundly speaking, to 37·5 therms per ton of coal carbonized. The installation, of course, only represents a small introduction into the ordinary gas manufacturing processes of the Company, whose ordinary plant already supplies 80 million c.ft. of gas per 24 hours. Our correspondent states that the installation is also to include a large carburetted water-gas plant, using raw coal; and he adds that the 3 million c.ft. of rich gas is to be mixed with water gas, to give an average production of 4 million c.ft. of town gas of 530 B.Th.U. per c.ft. Regarding these statements, in the first place we cannot see why "carburetted" water gas should be required for mixing with gas of 800 B.Th.U. to bring it down to 530 B.Th.U.; secondly, when we multiply the total production of coal gas—that is, the 3 million c.ft. by 800 B.Th.U.—we get 24,000 therms, as against 21,200 therms for the 4 million c.ft. of 530 B.Th.U. mixed gas. It looks very much as though in these statements there is something which requires further explanation or some amendment of the figures; for we cannot understand a reduction of the total calorific value from 24,000 therms for the gas from the low-temperature carbonization plant to 21,300 therms when an addition of 1 million c.ft. of water gas has been made. Perhaps our correspondent will be able to set this matter right. Another point is that it is stated that in the water-gas plant raw coal is to be used, which suggests that the New Jersey Company are assured of a good market for the daily production of 450 tons of solid smokeless fuel from the low-temperature plant, which, in addition, will produce 16,000 gallons of oil per 24 hours, which is equal to 25 gallons per ton of coal. This brief reference will no doubt induce our readers to consider the fuller details given in the article itself.

"Potential Investments."

Under this heading, our Stock Market correspondent is proposing to contribute to our columns at intervals a review of the financial position of, and the progress made by, certain selected gas companies. We have frequently had requests from investors interested in gas stocks that something of the kind should be done to afford them guidance. The first article appears in the current issue; others will be published at intervals, though not at definite dates.

Methods of Charging for Gas.

From the minutes of the National Gas Council, it is understood that a report has now been drafted on this subject, and is to be submitted for approval at an early date to the Committee who have been considering the question. The reference further states: "The subject, which is one of the utmost importance to the future development of the gas industry, has been found to be of such a complex nature that it is quite impossible to do justice to it if hasty conclusions are called for." There will be agreement with this. At the same time, the sooner we can get this matter settled, the better. We must not allow our competitors to get well away with the fixed primary charge and a low secondary one for all purposes before we make a real general start. It must be remembered that this method of charging is one of three important members in the policy of the rival industry—the other two being service to the consumer and assisted wiring.

Road Tar Association.

It is hoped that, now this Association has been placed on a properly constituted basis, gas undertakings which do not at present subscribe will become members. It is also suggested that the managements of gas undertakings who experience any difficulty in connection with tar for road purposes should at once communicate with the Association, and supply details as to the difficulty, in order that assistance may, if possible, be rendered in dealing with the matter.

Coal Output.

The weekly coal output in relation to the number of wage-earners is being maintained. The week ended Sept. 17 exemplifies what has been going on lately, despite non-paying mines closing, and fewer workers being employed. The production in the week named was 4,978,600 tons; the number of workers being 981,900. The average production per wage earner was therefore slightly over 5 tons. The figures for the succeeding week (the one ending on Sept. 24) are very similar. The coal raised amounted to 4,987,400 tons, with 982,600 wage earners.

Hastings Doubtful.

Brighton is not the only seaside resort on the South Coast which is wondering whether or not it will benefit from the London and South-Eastern electricity generation scheme, of which notice was made in our "Electric Supply Memoranda" last week. In an article in the "Hastings and St. Leonards Observer," the question is asked: How will the scheme affect Hastings? It is claimed that the Corporation station is one of the most modern, and is operated as efficiently as any in Sussex. Therefore in some quarters there was a not unnatural hope that Hastings would be chosen as one of the selected stations under the scheme. According to the writer, it now appears that the Hastings area will receive its supply either from Brighton or from Barking, *viâ* Chatham, Canterbury, and Folkestone. It is calculated that the transmission lines from Brighton to Hastings, *viâ* Eastbourne, will be completed by Oct. 31, 1929; the other line *viâ* Canterbury and Folkestone a year later. There is an indication of a hope that Hastings will be able to undercut Brighton or Barking in production costs, and that the local generating station will still be maintained. But what about future loans? Existing stations cannot be carried on without extensions or plant replacements; and the Electricity Commissioners can refuse the granting of further loans. There is in the article warning for the public against expecting lower charges at once. It is regarded as Gilbertian that quite recently the Electricity Commissioners empowered the extension of the Hastings undertaking, and have still more recently approved of a loan for that purpose. Yet they are now, under the new Act, seeking to stamp out in a few years all the smaller generating stations, of which Hastings is one. The article indicates suspicion on the part of the writer that the promised savings from central generation will be offset by the various losses arising through long-distance transmission, transforming, and regulation of the supply.

New Agreement for Durham Coal Miners.

The Durham coal industry is faced with the prospect of having to negotiate a new coal wage agreement, in view of the

fact that the present one is terminable by a month's notice from Nov. 30. It is the shortest of the district agreements entered into under the strike settlements of December last year; and there is a widespread view that the experience of the county during the time which has elapsed has made revision imperative. Both the employers and the Executive of the Durham Miners' Association have recognized this; and it is, therefore, not astonishing that tentative proposals regarding terms for a new agreement have been submitted by the employers. Although the suggestions have been considered by the Durham County Mining Board, and a copy has been sent to the Executive of the Miners' Federation, both the Mining Association and the Miners' Federation are excluded from discussions under the present arrangements, which provide for district agreements based upon district consideration of local conditions. The progress of events in this matter will be watched with interest and some anxiety, in view of the fact that Durham provides the first instance of the expiration of an agreement entered into at the end of the great strike.

PERSONAL.

LONG DIRECTORIAL SERVICE.

At the October meeting of the Directors of the Thame Gas and Coke Company (Oxfordshire), Captain C. F. Howland (at the age of 85 years) tendered his resignation, having completed 56 years of service, the last 33 years of which he was Chairman. During the 56 years, the Company has held 399 meetings; and he has missed only 26. The make of gas 55 years ago was 1 million c.ft.; to-day it is 16 million c.ft. per annum.

We offer our congratulations to Captain Howland on his length of service, the keen interest he has taken in the Company, and the success that has been achieved during the time he has had a seat on the Board; and we wish him continued good health in his retirement.

Mr. Lawrence G. Williams has been elected Chairman of the Cardiff Gas Light and Coke Company, in succession to the late Mr. C. E. Dovey; and Mr. Robert H. Williams has been appointed Deputy-Chairman. Mr. Lawrence Williams is a solicitor, and had acted as Deputy-Chairman of the Company prior to Mr. Dovey's death. He has taken keen interest in the co-partnership scheme of the Company, and has also done a great deal in the direction of fostering the social amenities of the employees. The result is that his relationships with the workmen have been of a very happy character; and he thus maintains the traditions of those who have been guiding the destinies of the Cardiff gas undertaking since its inception about ninety years ago. Mr. Robert Williams, also, is ever solicitous of the welfare of all those at the gas-works. His family have been associated with the undertaking since 1837, when his grandfather was elected the first Chairman of the Company after it received its charter.

The marriage took place, on Oct. 15, of Miss Florence Ethel Hawkes, of Margate, and Mr. Geoffrey W. Broughton, only son of Mr. Joseph T. Broughton, of Haslingden, Manager and Secretary of the Haslingden Union Gas Company. The bridegroom has been Technical Assistant to the Herne Bay Gas Company, and was recently appointed Assistant Manager to the Haslingden Union Gas Company.

Councillor Samuel Shadbolt, Manager of the South Bank and Normanby Gas Company, and Mrs. Shadbolt have been presented with a silver coffee-pot by the staff and workmen, to mark their silver wedding.

Retiring on superannuation after 50 years' service as clerk in the Darlington Corporation Gas Department, Mr. F. J. Armitage has been presented by his colleagues with a case of pipes and a silver-mounted walking stick. Mr. A. E. Ruffhead (the Gas Manager) made the presentation.

Sir William James Larke, K.B.E., has been appointed by Order of Council dated Oct. 5, 1927, to be a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

The Council of the Iron and Steel Institute have recently awarded the Carnegie Gold Medal for the year 1925 to Mr. A. L. Curtis, Westmoor Laboratory, Chatteris, in recognition of his research work on steel moulding sand, &c.

OBITUARY.

We deeply regretted to learn, on the eve of going to press with this issue of the "Journal," of the death, at Bromley, Kent, on the 14th inst., of Mr. Alexander Dickson, a Director of the South Suburban Gas Company, and formerly Chairman of the Bromley Gas Company. He was in his 87th year.

NATIONAL GAS COUNCIL.

A Meeting of the Central Executive Board of the National Gas Council took place on Oct. 11 at 28, Grosvenor Gardens, S.W. 1. In the absence of the President, Sir David Milne-Watson, the Chair was taken by Mr. William Cash, F.C.A., Vice-Chairman.

Committee on Methods of Charging for Gas.

It was reported that the Committee appointed by the Central Executive Board to consider whether it would be practicable to adopt some method of charge alternative to, or in substitution for, the existing flat-rate system had gone into this question in very great detail. The report was now in draft, and would be submitted to the Committee for their approval at an early date. The subject, which was one of the utmost importance to the future development of the gas industry, had been found to be of such a complex nature that it was impossible to do justice to it if hasty conclusions were called for.

British Road Tar Association.

It was reported that the first meeting of the First Managing Council of the Association had taken place on Sept. 20, when Sir David Milne-Watson was elected First President of the Association, Mr. H. C. Head Vice-President, and Mr. W. J. U. Woolcock Chairman of the First Managing Council, and Dr. J. A. Roelofsen (of Messrs. Dorman, Long, & Co.) Vice-Chairman. A Finance Committee and General Purposes Committee had been appointed, and a joint meeting of those two Committees had been held on the same day to consider urgent business.

The hope was expressed that now that the Association had been placed upon a properly constituted basis, gas undertakings which did not at present subscribe would become members of the Association.

It was requested that gas undertakings would communicate with the Association when any question arose in their locality in regard to the use of tar for road purposes, as it was essential that the Association should have early information of any difficulties arising in various parts of the country, so that they might be given an opportunity of assisting and, where necessary, using their influence to see that British material had the first consideration for use on the roads of this country.

World Power Conference.

It was reported that a meeting of the International Executive Council of the World Power Conference had been held at Como in September, at which Mr. Fottrell represented Sir David Milne-Watson on behalf of the Council. Representatives from 25 countries were present. The item on the Agenda of immediate interest to the gas industry was the consideration of the programme for the Fuel Conference to be held in London in 1928. The programme was received with utmost enthusiasm by all the delegates present. At the conclusion of the Meeting of the Council, a special meeting was called of representatives of countries particularly interested in fuel problems, at which Dr. E. W. Smith and Mr. Fottrell discussed with the delegates the particular contributions which might be expected from each country. Representatives also came specially from other parts of Europe to attend this particular meeting.

Up to the present, 36 countries had promised to contribute papers to the Fuel Conference, and the Technical Secretaries were at present in communication with the National Committees throughout the world regarding the nature of their respective contributions.

British Refractories Research Association.

A Memorandum from the British Refractories Research Association, on the need for further financial support to enable extended research to be applied to actual refractory troubles experienced in various industries, was considered. The matter was referred to the Institution of Gas Engineers for consideration and report.

Employers' Liability Policies.

It was reported that new rates proposed by Lloyds' Underwriters as applicable to future policies under the Council's scheme for the above risk had been carefully considered by a Committee of the Council appointed for the purpose. As a result of this examination, the Committee were satisfied that the proposed increase of premium was reasonable, and fully justified the uninterrupted support of gas undertakings throughout the country.

Individual Share of Annual Gas Sales.—Every man, woman, and child in the United States would receive 12,281 c.ft. of gas, if the total amount of manufactured and natural gas sold in 1926 were to be apportioned evenly. This is stated in a recent report of the American Gas Association. Manufactured gas sales totalled 459,000,000,000 c.ft., while natural gas sales far exceeded this amount. The quantity of gas sold in 1926 in the United States would supply every individual in the world with 825 c.ft.

ELECTRICITY SUPPLY MEMORANDA.

Housing Estates.

THE General Purposes Committee of the London County Council have been giving further consideration to the report of the Advisory Committee who were appointed some time ago by the Electricity Commissioners to consider and report on the question of the development of domestic supplies of electricity. More than twelve months have passed since the Advisory Committee issued their recommendations; and last Spring the L.C.C. General Purposes Committee reported as to the undesirability of accepting a recommendation regarding the partial exemption from assessment for rating of underground cables and works. We commented on their views in the "JOURNAL" for April 20 last (p. 162). In a further report, the General Purposes Committee deal with other recommendations of the Advisory Committee, in regard to which they have taken counsel with the Highways and Housing Committees of the Council. It will be remembered that the Advisory Committee urged that every endeavour should be made to overcome the initial difficulties connected with the provision of wiring installations adequate for all domestic uses of electricity in both old and new houses. They also deplored the fact that many housing estates are being built remote from facilities for obtaining electricity, or are being wired for electric lighting only. They submitted that everything possible should be done to provide a supply of electricity in all areas where there is a demand and reasonable prospect of its becoming remunerative; and whether an immediate supply is available or not, builders and owners of property should be encouraged to wire fully all new houses in anticipation of a supply of electricity becoming available at economic prices at an early date. The General Purposes Committee have obtained from the Housing Committee interesting information as to the extent to which electricity is available on the Council's Housing Estates; and it is worth quoting.

The Particulars.

From the details furnished by the Housing Committee, it is learned that, in the case of pre-war dwellings, electric lighting has been, or is to be, installed in a few houses by the supply authorities at the request of the tenants. As regards estates, &c., which have been developed partly or wholly since the war, it appears that at ten of them—including Becontree, Roehampton, Bellingham, Downham, White Hart Lane, Old Oak, and Norbury—no electricity has hitherto been installed for any purpose. Negotiations are, however, in progress with a view to electric lighting being provided on sections of Downham and Becontree still to be developed; while at Becontree and at Old Oak electric lighting is being installed by the supply authorities in some of the houses at the request of the tenants. The Council are undertaking wiring for lighting only at three, and the supply authority at four, estates. At Watling, Kennings, Kennington, and Dickens (Bermondsey) Estates the supply authority are wiring for lighting and one or more utility points in each house or tenement; and at Whitmore Estate, Hoxton, and Whiston House, Shoreditch, for lighting, heating, and cooking. On Castelnau Estate, 57 of the houses are being wired by the Council for lighting, heating, and cooking, and the remainder of the houses for lighting only. To ensure the use of electricity for purposes other than lighting, the Housing Committee regard it as an essential condition that the method of charge for energy should involve the use of only one installation and meter for all purposes, as is emphasized by the Advisory Committee. Such methods of charge will obtain at Castelnau, Watling, and Kennings Estates, and comprise a fixed sum payable weekly or quarterly, and a low rate per unit for all energy consumed. The Housing Committee also point out that it is essential that the tenants should be able to hire appliances at reasonable rents from the supply authorities, who should be not only able and willing to educate the tenants in the use of them, but should also furnish an efficient maintenance service. Some supply companies are now evincing eagerness to foster business on housing estates, and to do the wiring free of charge, if they are assured of some reasonable prospect of the tenants taking energy. In concluding, the General Purposes Committee refer to a report of theirs issued in February, 1925, in which they mentioned difficulties the Housing Committee have to face in deciding whether gas or electricity or both should be installed in the Council's dwellings and houses. These difficulties, it is stated, still obtain; but the General Purposes Committee are assured that the Housing Committee have the problem under constant review.

Service.

In last week's "Memoranda" attention was drawn to the opening of the six months' Circle Campaign, as planned by "E.D.A." The campaign is to cover the whole field of domestic electrification. We were under the impression that last year's "W.O.B." campaign was not, as is usually stated, limited to lighting, seeing that the demonstration houses and exhibitions covered everything from lighting to cooking, room warming, and water heating. In our comments last week, reference was made to certain points in the message which Sir James Devonshire delivered at the inaugural luncheon in London, and which was repeated at the various luncheons in the Provinces. We have not heard that there was any great number of these functions, except in the large centres like Manchester, Liverpool, Leeds, Birmingham, Newcastle, Bradford, Harrogate, and a few other places. One point in Sir James' message which we did not notice is that electricity undertakings are awakening to the meaning of the term "Service." They have found that service does not only include the supply of appliances and electricity, but it embraces the help necessary to ensure that people get their premises wired and electrically equipped in a proper manner, and, when this is done, that it is then maintained in efficient condition. It it further stated that service extends to teaching people of every class how best to use electricity with economy for all purposes. We pause over that. What is meant by "economy?" If the word connotes frugal use of electricity, our old rivals are past-masters at trying to teach people the need for that. Electricity being the dearest heating agent in existence, frugal use is the only means of realizing economy for the consumers' pockets. Even then electricity dips deeper into them than any other heating agent for a corresponding amount of work.

School Children and Lecturers.

Mr. V. W. Dale, Business Manager of the "E.D.A.," at the first conference arranged by the Association for this session, spoke of the success of the Circle Campaign being fully assured. There are two other points in his address which are specially interesting, as indicating an expansion of activities. Plans have been developed by which it is hoped to reach 90 to 95 p.ct. of the children of the elementary schools, with a series of twelve lessons on the applications of electricity. Apparently the electricity industry is looking forward to the time when the children will possess homes of their own, and become electricity patrons, unless, of course, it happens that the greater economy of applying gas to domestic purposes induces, when the children of to-day are the people who have to pay, a disinclination for electrical operation. The other point has regard to the development of propaganda work among the numerous societies which exist in almost every town and village of the country. The Association look upon these as providing excellent platforms for electrical lectures; and so they have prepared a series of discourses on electrical subjects which can be placed in the hands of any one willing to act as lecturer. In this connection, Mr. Dale made a suggestion. He believes there are half-a-million people employed in the electrical industry; and he asks those in charge of supply undertakings and business concerns to break-down reserve and get to the members of the staff to discover the latent talent among them. The Association have already 42 towns covered by their lecture panel, 33 Electric Circles are co-operating, and they have over 70 lecturers enrolled. They would like to secure 5000 lecturers, or, if they cannot obtain that number, there would be rejoicing over a register of 1000. However, returning to the winter's campaign, Mr. Dale sums up its intentions in these words: "The object of the advertising is to bring before the public the general advantages of electricity; to shout electricity into the ear of the public; to inspire the public with confidence in electricity; to dissipate some of the absurd fallacies which are still present in the minds of the public with regard to cost, and to spread the gospel of hygiene, which is to be obtained through the process of domestic electrification." There we will leave it; it is a big programme, and yet it does not, as presented, comprehend all that the public desire to know.

Flex and Warning.

"Megohm" in the "Electrical Times" makes allusion to the comments in the "Memoranda" a short time ago on the subject of fatalities which have occurred through the use of defective flex, and to our suggestion that electricity consumers should be cautioned by electrical undertakings of its danger. "Megohm" says that we submitted that it is the duty of electricity supply undertakings to warn the public against employing electric contractors who do cheap and inferior work. We see nothing wrong in that; but he adds that it would be a matter of some difficulty to warn the public against the work of individual firms. There was no suggestion whatever that electricity undertakings should mention individual firms, but we see very good reason in the recent fatalities for their issuing a general caution against the adoption of cheap and inferior work. Then he proceeds to say that his "gas friends can rest assured that, in addition to the ordinary routine test before houses are connected-up, the power of inspection is exercised fully by the central station authority, when contractors are either unknown, or in a sense too well known to them." That no doubt is valuable work. Nevertheless, "Megohm" knows as well as we do that there is in existence a tremendous amount of installation work of an in-

ferior order, and which has been—notwithstanding the power of inspection—connected-up to the supply cables. And in the case of flex, it is not when it is new, but as it becomes worn and frayed and the insulation damaged that the real danger arises. That being so, it is a substantial argument for periodical inspection; but "Megohm" says: "It would be a matter of considerable difficulty for a gas company to inspect regularly taps, fittings, and gas pipes of existing installations, and the ventilation of gas stoves. I am in fact even doubtful whether they would have power to make such inspections against the wish of a consumer." In some Gas Acts, there is a special clause empowering inspection, and the adoption of the clause is growing in the gas industry. Further, it should not be overlooked that (not in consumption, but in numbers) we have more prepayment than ordinary consumers; and among prepayment consumers there is greater inspection and maintenance, and very rarely an accident. Moreover, the system of free inspection and maintenance of ordinary consumers' equipment is a spreading policy in the gas industry; and it is not found to be a matter of such considerable difficulty as would be imagined when organized on systematic lines. Looking at the mass of inferior electric installation work (which has led to the registration of contractors), we have some doubt as to the soundness of the foundation on which "Megohm" bases his belief that electricity undertakings exercise their powers of inspection to the full.

All-Electric Houses. The electrical papers have given good circulation to a report by the Electrical Engineer of Stoke-on-Trent regarding particulars of costs, &c., in connection with "all-electric" houses in the district since they were occupied in the middle of April last. The figures, however, as published, do not really impart much definite information. It is stated that the electricity consumed for lighting was 121 KW.-H., for heating and cooking 5106 KW.-H., and for water heating 4414 KW.-H.—a total of 9641 KW.-H. Of course, we do not know the actual number of weeks to which the figures refer; but it is stated that the average cost per week was, for lighting 7¾d., for heating and cooking 5s., and for water heating 2s. 1½d.—a total of 7s. 9d. per week per house. This payment per house represents a total of £20 3s. per annum; but we rather think this sum will be considerably exceeded in a year if the houses are really all-electric ones. It will be observed that the figures apply to the lightest and warmest months of the year; and they entirely avoid those during which heat for warming, cooking, and water is required to an extent far greater than from April to September. It will be interesting to have complete data when twelve months have ended, including the average consumption per house per week (in addition to the average payment per house per week), so that we may see what is the average payment per unit.

Electric Fires and Radiant Heating. In "The Electrical Times," "Hotspot" refers to a book written by Mr. H. G. Solomon, Consulting Electrical Engineer, on the electrical heating of residences and public buildings, and electric hot water supply and cooking. He states that the author has done his work well, and a satisfactory feature of the volume is that no attempt is made to draw comparisons with other heating agents—such as gas, coal, oil, &c. Perhaps this is just as well, when the endeavour is to serve the interests of electricity rather than the consumers of it. We are attracted by a few remarks regarding the radiant heat emitted by electric fires. Some electricians claim that the heat given by electric fires is mainly of the radiant order. But "Hotspot" thinks Mr. Solomon has given values which are definitely too low to be representative of good modern practice. His figure for the best types is 60 p.ct., and an average figure is 40 p.ct. The critic quotes Prof. Barker and Dr. Margaret Fishenden, who gave 70 or 80 p.ct. as a maximum for the best designs, and 60 p.ct. as a good average. The radiant heat emitted by the "Sunray" type is 85 p.ct.—whether by scientific tests or assumption is not stated. We know that tests of different electric heaters give radiant efficiencies which widely differ; and, after all, whatever be the radiant and convected proportions, no one denies, and no sane person can deny, that the cost of the potential heating energy in the electrical form is much too dear for ordinary heating purposes.

Cooker Control. In a letter to the "Electrician," Mr. George Nicolson, Borough Electrical Engineer of Weymouth, says:

> No one knows better than the supply engineer the defects of electric cooker hot-plates, but regarding three-heat control it seems a compliment is being paid the industry when the gas cooker manufacturers are endeavouring to copy their example by fitting gas stoves with marked regulated control, so as to enable the woman who does the cooking to have more flexibility in her cooking operations.

Mr. Nicolson writes without complete knowledge. No compliment is being paid by the gas industry to the electricity industry in this particular regard. For very many years gas-operated water-heaters have been fitted with thermostatic control; and what is being done in connection with gas cookers in this country was a practice initiated long ago in the American gas industry. It is not a three-point control which has been applied to gas cookers; it is control which can be applied to any desired temperature degree according to the character of the food which is being cooked. Therefore, we are not "endeavouring to copy" the electrical industry's method, which confines them to (say) three fixed temperatures, and which condition is forced upon them by the physical circumstances with which they have to contend, and from which they do not appear to be able to devise any means of escape.

Mishaps. On Oct. 7, there was a fire at the house of Lady Gerald Wellesley in Mount Street, Park Lane. One report before us states that it was evidently caused by the fusing of an electric wire in the service lift. Her ladyship and her daughter, and the staff of servants, appear to have had an exciting time in effecting their escape through the intense heat and smoke. The "Yorkshire Post," on Oct. 1, reported a fire at the West End Chemical Works, Pemberton, Wigan, which caused several thousand pounds of damage. It states that it is not definitely ascertained how the fire broke out; but it is supposed that it originated from the short-circuiting of an electric wire. All such suppositions, according to electrical theory, are wrong. On the 7th inst., three men—two workmen and a gallant constable—were fatally gassed in an electric inspection chamber at Notting Hill. The chamber was at the bottom of a vertical shaft about 3 ft. 6 in. square, and descending to a depth of 25 ft. It is stated that it was sealed in 1905, and had not been opened since. The men were instructed not to descend until the shaft had been ventilated; but they appeared to have thought the conditions were all right. During a heavy fog on Oct. 5, the whole of the electricity supply of Fulham collapsed. It is stated that the cause was a burn-out on the main switch at the station. The failure continued for about an hour.

SOCIETY OF CHEMICAL INDUSTRY.

"The Seven Lamps of Chemical Enterprise."

The Manchester Section of the Society of Chemical Industry held the first meeting of the 1927-28 Session on Friday, Oct. 7, when Mr. C. J. T. CRONSHAW, B.Sc., the Chairman of the Section, presided. There was a large attendance of members, among whom were included Mr. L. Guy Radcliffe, the previous Chairman of the Section, and Dr. E. F. Armstrong.

The Chairman delivered an address entitled: "The Seven Lamps of Chemical Enterprise," in which he defined the lamps as being Research, Precision, Service, Unity, Judgment, Leadership, and Vision.

Mr. Cronshaw said that the possible routes to chemical substances were usually both numerous and varied, and the ultimate choice was made on general economic grounds. Consequently slight changes in price of a few products were sufficient almost to upset a section of chemical industry; and this same economic trend might often, further to complicate the position, bring new products into extended use. Moreover, economic factors often played strange tricks, converting useless bye-products into the salvation of a moribund industry, and relegating hitherto profitable materials to the background. As the science of chemistry grew and expanded, it robbed; and as it robbed it bestowed—not, unfortunately, always on its early victims—great and glittering prizes.

Perhaps such generalizations would more gracefully commend themselves to his hearers if they were supported by some of the specific examples upon which they properly stood. The coal gas industry was probably the classic example. It was an industry which originally, and with no other thought, found its initiative in the provision of an illuminant, and which now held its place, at any rate in coal-bearing countries, by reason of the financial rewards in coal tar and ammonia. Even this sequence was on the threshold of disturbance by reason of the advance of synthetic ammonia; and it might be that ultimate and final relief was coming by way of low-temperature carbonization. This latter might also constitute a threat to the raw materials of the dyestuffs industry, since the tendency was for bye-products to change from an unsaturated to a saturated character. The dyestuffs industry almost existed on the presence of the double bond.

The production of metallurgical coke had passed through the same stages, and had found the same solutions.

"Britain's Fuel Problems."—This is the title of an exhaustive treatise on Britain's fuel resources, and their utilization and treatment, which is at present in course of preparation. Under the direction of the "Fuel Economist," the volume will consist of contributions from over fifty eminent specialists.

EVENING STAR LODGE, No. 1719.

Jubilee Celebration.

Fifty years ago (to be precise, on Aug. 28, 1877), the Grand Secretary of that time, the late V.Wor.Bro. John Hervey, conducted the consecration ceremony of the Evening Star Lodge, No. 1719, in which he was assisted by other eminent Grand Officers. The warrant bears date of Aug. 13.

It may not be generally known that this lodge is the mother lodge of those specially identified with the gas industry; the sister lodges being the Northern Star, which meets at Manchester, and the Murdoch which has its habitation in Birmingham.

Among the first officers of the Lodge were included W.Bro. A. V. Duff Filer, W.M.; Bro. Sir John Aird, Bart., S.W.; Bro. T. N. Kirkham, J.W.; Bro. James Glaisher, F.R.S., Treasurer; Bro. Magnus Ohren, Secretary; Bro. W. Sugg, S.D.; Bro. T. A. Greene, J.D.; Bro. J. W. Sugg, D.C.; and Bro. Hodgson Jones, I.G.

The names of Bros. Samuel Cutler, F. W. Hartley, J. S. Tamburini, and Robert Hunter appear on the list of original joining members. The first initiates were Bros. G. C. Trewby, Edward Hide, J. Manwaring, W. Cartwright Holmes, and Alfred Lass, followed shortly afterwards by Bros. John West and T. H. Martin, of whom the latter happily survives, and has been elected to honorary membership.

The jubilee was fittingly celebrated on Friday last, when members and visiting brethren, to the number of about two hundred and fifty, assembled in the Grand Temple of Freemasons' Hall, Great Queen Street, London, in which building the Lodge has continuously met from its foundation, excepting during the period when alterations were being carried out. The New Gaiety Restaurant (now Marconi House), Strand, was then utilized.

W.Bro. Frederick G. Cockey, the W.M., presided, with his Senior and Junior Wardens, W.Bro. Arthur L. Croager and W.Bro. James W. Foreman, in their respective chairs. The following represented Grand Lodge: R.W.Bro. Sir Alfred Robbins, P.G.W., W.Bro. H. E. de Rougemont, P.A.G.D.C., W.Bro. H. Bladon, P.G.St.B., W.Bro. L. F. Dunnett, P.A.G.St.B., W.Bro. A. Parr-Head, P.A.G.St.B., W.Bro. Frank Palmer, P.G.P., and W.Bro. Charles Sharp, P.G.D.

The W.M. referred in feeling terms to the loss sustained since the last meeting by the untimely death of W.Bro. Hermann L. Sheppard; and the deep sympathy of the brethren was expressed in the usual manner.

W.Bro. Lt.-Col. W. R. Glover, C.M.G., D.S.O., to mark the occasion of the jubilee, and in remembrance of his brother, Bro. Richard Gaskell Bowie Glover, who was killed in action during the Great War while a member, asked the Lodge's acceptance of a W.M.'s collar beautifully embellished with a silver chain of office. The gift was received with grateful appreciation.

Mr. William Ronald Edgar, Managing Director of Messrs. William Edgar & Son, Ltd, was balloted for and was unanimously elected as a candidate for initiation.

The officers then vacated their positions, which were filled by the following past masters:

W.M.—W.Bro. Arthur Valon, L.R.
I.P.M.—W.Bro. Alfred H. Henry.
S.W.—W.Bro. E. G. Smithard, P.P.G.Treas. (Norfolk).
J.W.—W.Bro. Arthur E. Croager, P.P.G.D. (Kent).
Chaplain.—W.Bro. Charles Clare.
Treasurer.—W.Bro. Thomas Cash, L.R.
Secretary.—W.Bro. Walter T. Dunn, L.R.
Dir. of Cer.—W.Bro. Alfred C. Beal.
S.D.—W.Bro. H. W. Packham, P.P.G.D. (Surrey).
J.D.—W.Bro. J. Fred Wicks.
I.G.—W.Bro. Frank West.

Bro. James W. Swan officiated as organist in the regretted absence of Bro. John F. Simmance.

Mr. Edgar was admitted, and was duly initiated; W.Bro. A. E. Broadberry, P.M., L.R., W.Bro. Jacques Abady, P.M., L.R., and W.Bro. Frank West taking part in the ceremony.

The W.M. and his officers having resumed their places, a few words of sincere welcome were addressed from the chair to the guests of the Lodge (members of the Northern Star Lodge, No. 3053, and of the Murdoch Lodge, No. 3480, of each of which sister Lodges there were a large number present) and the other visiting brethren.

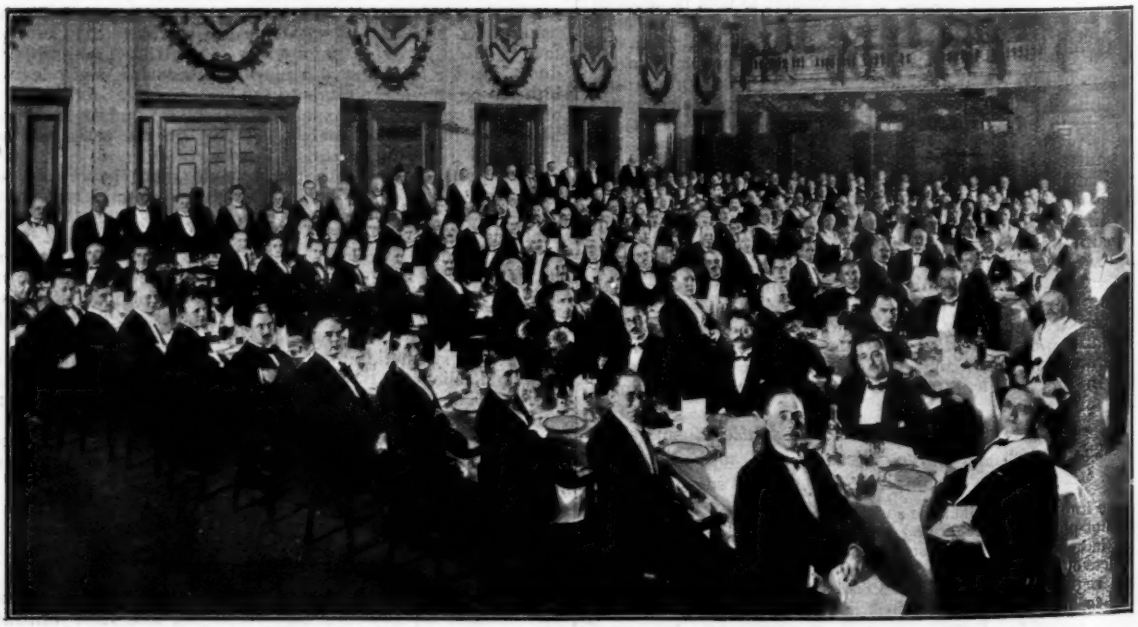
At the close of the Lodge the brethren dined together in the large hall of the adjoining Connaught Rooms, W.Bro. Cockey presiding. Some exceedingly interesting speeches were delivered in the course of the evening.

After the usual masonic toasts, that of the Grand Officers was acknowledged by R.W.Bro. Sir Alfred Robbins, P.G.W., President of the Board of General Purposes, who congratulated the Lodge on its jubilee and on the position it had attained in the masonic world.

Eloquently submitted from the chair, the toast of "The Memory of the Founders" was pledged in silence. That of "The Worshipful Master" was given with his usual felicity of expression by W.Bro. A. H. Henry, as I.P.M., and was graciously responded to. W.Bro. Jacques Abady proposed "The Initiate," in a most dignified and impressive manner, and Bro. Edgar briefly replied. The toast of "Our Guests," which was ably proposed by W.Bro. Broadberry, was acknowledged by W.Bro. Samuel Shadbolt, W.M. of the Northern Star Lodge; W.Bro. Frederick Vale, I.P.M. of the Murdoch Lodge (in the unavoidable absence of its Master); W.Bro. Ernest Stone, W.M. of the Junior Engineer Lodge, No. 2913 (of which the Evening Star Lodge was sponsor when it was consecrated in 1902); and W.Bro. P. C. Lord, P.G.S.G.W., Egypt and the Soudan.

To the toast of "The Past-Masters," which was proposed from the chair, W.Bros. Thomas Cash and Arthur Valon replied; the latter being the oldest subscribing P.M. His speech included references to the history of the Lodge and those who had served the office of Master.

W.Bro. W. T. Dunn gave "The Officers," which was replied



THE JUBILEE BANQUET OF THE EVENING STAR LODGE, No. 1719.

to by the S.W., W.Bro. A. L. Croager, and the Secretary, W.Bro. Rae P. Normand, to whom cordial tribute was paid in recognition of his arduous labours in organizing and carrying through all the arrangements of the celebration which had proved so successful. A notable item of his work was the preparation of a well-executed souvenir in which was contained several pages of historical notes and other information.

It should be added that the toasts were interspersed with well-rendered musical items under the direction of W.Bro. Herbert Townsend.

May the Lodge during the next fifty years on which it has entered be able to record a period of beneficent usefulness equal in value to, if not exceeding, that relating to the half-century the close of which it has just so happily celebrated.

POTENTIAL INVESTMENTS.

[By Our Stock Market Correspondent.]

In response to requests received from investors interested in gas stocks, it is proposed, at intervals, to review the financial position of, and the progress made by, certain selected gas companies.

(1) The Gas Light and Coke Company.

This Company, the largest gas undertaking in the world, has an annual output of gas amounting to over 45,000 million c.ft. It was incorporated by Royal Charter in the year 1812, and further powers were obtained in various Acts between the years 1868 and 1926. Many important companies have been absorbed; and the last and largest of these was the Brentford Gas Company, at the beginning of the year 1926.

The capital authorized and outstanding (this including £14,424,874 added on conversion, and after deducting £495,460 ordinary stock redeemed) is at present £25,504,480, consisting of:

	£18,747,460 ordinary stock.
	2,600,000 3½ maximum stock.
and	4,157,020 4 p.ct. consolidated preference stock.
	£25,504,480

The standard price is 11⅜d. per therm, and the present price charged 9d. per therm. Dividends on the ordinary stock are subject to the sliding-scale—*i.e.*, each ⅛d. per therm charged below the standard price increases the dividend by 2s. 8d. p.ct. per annum; but when the price charged is below the standard price, contributions approximating from 1s. 4d. to 5s. 4d. p.ct. have to be made to a capital redemption fund until £1,000,000 capital has been redeemed. The amount redeemed up to December, 1926, was £495,460. The Act of 1926 provides that, if and whenever the rate of dividend (under the sliding-scale) in any half-year is less than 5 p.ct. per annum, the Company may pay a dividend at any rate not exceeding 5 p.ct. per annum, provided the appropriate redemption fund contribution is set aside. The provisions of the Act are subject to revision every five years.

It will be seen from the table printed below that the capital expenditure per thousand cubic feet sold in the year 1903 was 13s. 6d. This figure, even at that date, was exceedingly high, but careful administration has brought about a complete change, and for last year the figure stood at 8s. 7d., which is well within the bounds of practical politics. Moreover, there is every indication that the amount will be reduced still further in the near future.

The gas sold has increased from 20,529 million c.ft. in 1903 to 45,044 million c.ft. in 1926—an increase of 119 p.ct. The amalgamations made during the present century—the West Ham Company in 1910, the Barking and Chigwell Companies in 1912, the Ilford Company in 1922, and the Brentford Company in 1926—have an important bearing on the comparative sales. As the total output of the Companies mentioned, at the dates of amalgamation, amounted to about 9000 million c.ft. only, the balance of the increased sales—15,500 millions—equals as much as 75 p.ct. on the 1903 figures.

The following table illustrates the progress made. The period of the war, and the subsequent four years, have, owing to the abnormal conditions then prevailing, purposely been ignored.

Year.	Quantity Sold. Million C.Ft.	Capital Expended. 1000 C.Ft. Sold. (See Note.)	Gross Profit.	Dividend and Interest, including Contribution to Redemption Fund.	Rate of Ordinary Dividend Paid. P.Ct. per Annum.	Carried Forward and Balance Reserve Fund.
		s. d.	£	£	£ s. d.	£
1903	20,529	13 6	1,167,372	1,057,101	4 8 0	232,679
1908	21,946	12 7	1,181,318	1,097,545	4 10 8	489,306
1913	27,158	11 2	1,170,897	1,236,369	4 17 4	485,338
1923	33.412 Therms. Dec. Cal. Val. 167,059,775	9 3	1,378,811	1,395,871	5 5 4	357,274
1926	Million C.Ft. 45,044 Therms. Dec. Cal. Val. 225,222,430	8 7	1,337,846	1,615,663	5 0 8	206,771

NOTE.—The capital expended shown herein is reduced by 50 p.ct. of the amount of stock redeemed, being approximately the nominal value of such stock prior to conversion.

The following table shows the prices of the highest and lowest transactions during the year, the dividend paid, and the yield on the average price during the past four years.

Year.	Transactions.		Dividend. P.Ct. per Annum.	Yield P.Ct. per Annum on Average Price.
	Highest.	Lowest.		
			£ s. d.	£ s. d.
1923	100⅜	90⅛	5 5 4	5 10 2
1924	97	90	5 6 8	5 14 1
1925	98⅛	79½	5 2 0	5 14 9
1926	87½	76⅛	5 0 8	6 2 11

The highest dividend that can be paid for the current half-year is £5 1s. 4d. p.ct. per annum; but at the present price of gas (9d. per therm) the authorized dividend is £5 6s. 8d. p.ct. per annum, and given normal conditions during the year 1928, the prospect of a higher distribution is quite good. At the present average market price of 91, the yield (at £5 6s. 8d. p.ct.) is £5 17s. 2d. p.ct.

FORTHCOMING ENGAGEMENTS.

Oct. 20.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting in the Council House, Birmingham, at 6.15. Presidential Address of Mr. H. R. Hems.

Oct. 22.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the Falkirk Gas-Works.

Oct. 22.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Annual general meeting at Leeds University. Address by Prof. J. W. Cobb.

Oct. 27.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Autumn general meeting. Grand Hotel, Birmingham, at 2.30.

Oct. 27.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, S.W. 1, at 2.30.

Oct. 27.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Hercules Cycle Company, Ltd., Aston.

Oct. 28.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute, 7.30. Presidential Address of Mr. Leonard Lacey.

Nov. 1.—GAS COMPANIES' PROTECTION ASSOCIATION.—Annual meeting, Caxton Hall, at 3 o'clock.

Nov. 5.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Joint meeting with the Western District at Glasgow.

Nov. 5.—WESTERN JUNIOR GAS ASSOCIATION.—Meeting. Papers by Mr. J. Malsbury, B.Sc., of Weston-super-Mare.

Nov. 8.—NATIONAL GAS COUNCIL.—Meeting.

Nov. 8.—FEDERATION OF GAS EMPLOYERS.—Meeting.

Nov. 9.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to Watson House.

Nov. 16.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—General meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15.

Nov. 17.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn general meeting at the Hotel Cecil.

Nov. 24.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—Quarterly meeting in Leeds.

Nov. 25.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute, 7.30. Paper by Mr. T. Campbell Finlayson.

INSTITUTION OF GAS ENGINEERS.

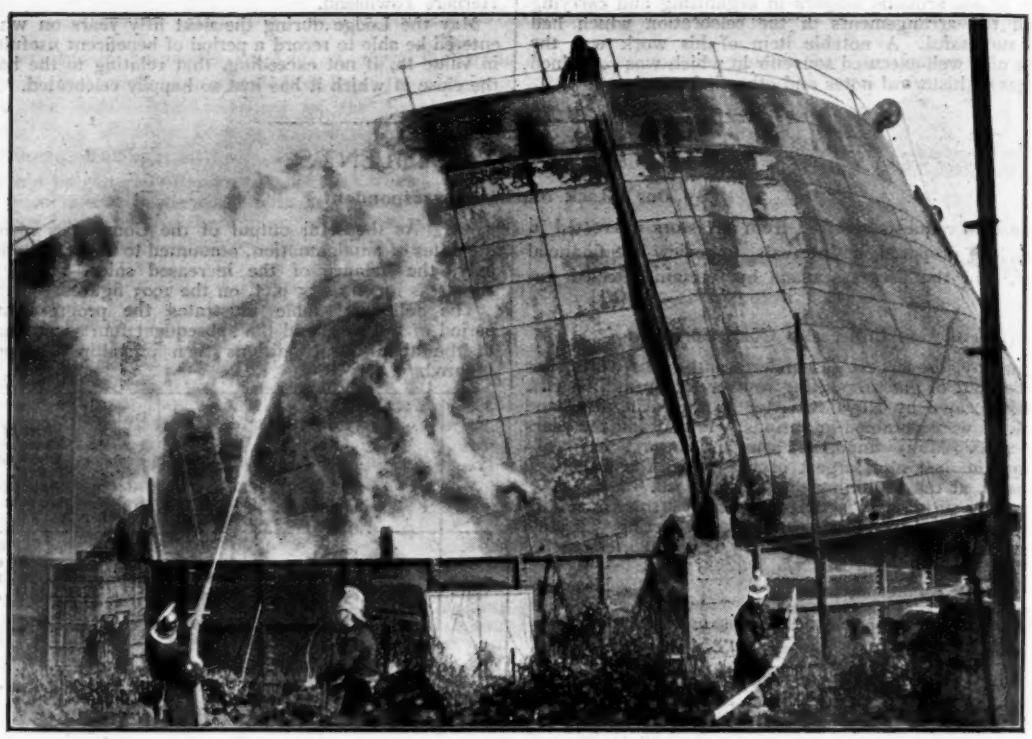
Nov. 7.—Emergency Committee.

Nov. 7.—Finance Committee.

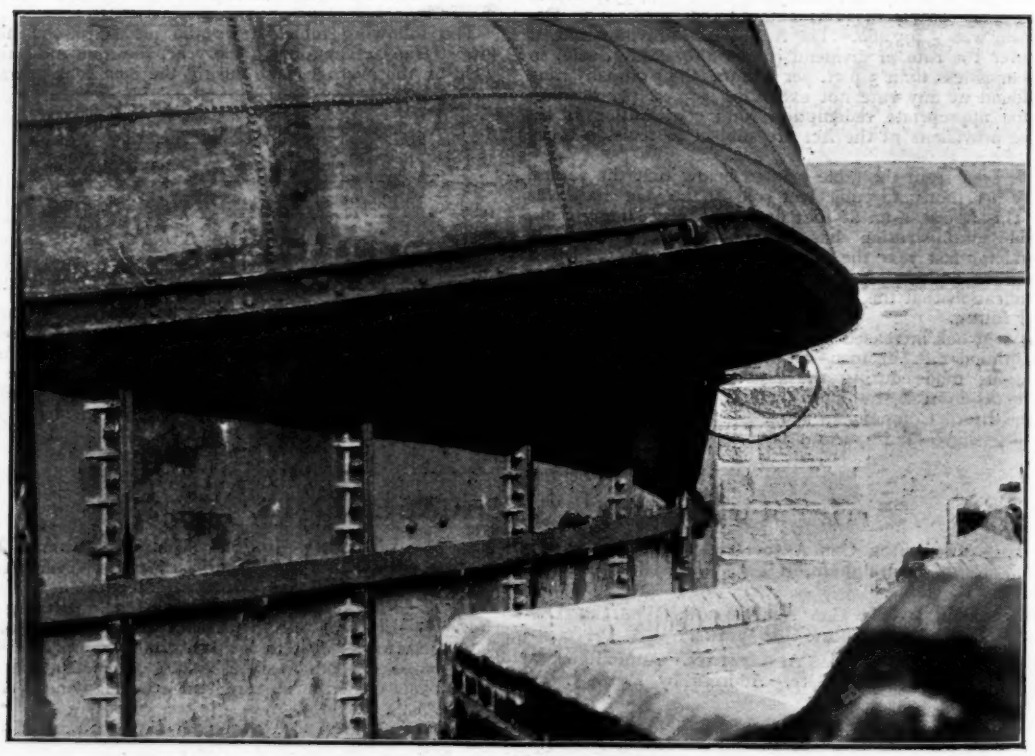
Nov. 7.—Council Meeting.

Nov. 15.—Public Works, Roads, and Transport Congress. Morning—Joint Session with Incorporated Municipal Electrical Association for discussion on "Street Lighting." Afternoon—Institution Session for discussion of "How the Gas Industry can Assist Smoke Abatement."

CABLE-GUIDED HOLDER DESTROYED AT TRURO.



THE CONDITION OF THE HOLDER AFTER THE EXPLOSION.



THE GAP IN THE HOLDER.

The Truro Gas-Works were the scene of a serious accident on Monday, Oct. 10, at 11.50 a.m., involving the destruction of the largest gasholder and two cottages, the property of the Gas Company. The holder was a cable-guided one of 135,000 c.ft. capacity, and contained about 120,000 c.ft. of gas at the time of the accident.

No definite cause can yet be assigned for the accident; but from evidence available, it seems probable that the original explosion occurred in one of the cottages about 50 ft. from the holder. The force of this explosion was tremendous; the walls of the cottage being blown outwards in all directions. Portions of woodwork were afterwards found on the gas-works far beyond the wrecked holder.

The shock of this explosion may have caused the holder to tip and discharge its gas from under the bottom ring and around the cup. Charred fragments of the woodwork of the house were blown against the holder, and probably ignited the escaping gas; and this fire practically completed the destruction of the holder, which is an almost total loss. The cottage in which the explosion occurred is completely wrecked, and the neighbouring one badly damaged.

Fortunately no serious personal injury resulted from the acci-

dent. The occupants of the cottages and the driver of a van, which was stationary outside and was buried by the falling masonry, all escaped with minor burns and bruises, and suffered chiefly from severe shock. The van driver only was detained at the Royal Cornwall Infirmary, where the injured persons were treated.

The site is now being cleared; and it is hoped that some evidence may be obtained which will throw further light on the cause of the disaster.

We sympathize sincerely with the Company and the Managing Director and Engineer (Mr. Samuel J. Ingram) over this unprecedented catastrophe.

LOW-TEMPERATURE CARBONIZATION PLANT TO GIVE 4,000,000 C.Ft. OF GAS PER DAY.

Public Service Electric and Gas Company, New Jersey, U.S.A., Sign an Important Contract.

[From Our Own Correspondent.]

An event of outstanding interest in the town gas industry is that the Public Service Electric and Gas Company, of New Jersey, who already have installations supplying 80 million c.ft. of town gas per 24 hours, have just signed a contract with the International Combustion Engineering Corporation of New York, to put down a low-temperature carbonization plant with a throughput of 640 tons of coal per 24 hours. This is to consist of eight "K.S.G." process retorts, each of a capacity of 80 tons per 24 hours, giving a total yield of about 2,500,000 to 3,000,000 c.ft. per 24 hours of very rich gas—800 B.Th.U. per c.ft. At the same time the installation will include a large carburetted water gas plant, using raw coal, in two separate units, each with its own generator, superheater, and carburetter, capable of giving 3 million c.ft. of water gas per 24 hours. Normally, however, this will not be operated at full capacity. The 3 million c.ft. of rich gas is to be mixed with water gas to give an average production of 4 million c.ft. of town gas of 530 B.Th.U. per c.ft. A complete bye-product and purification plant of the most extensive character is also included, along with all accessory equipment, and a gasholder of 500,000 c.ft. capacity. The whole installation is to be running on March 1, 1929. The output will also include 450 tons of solid smokeless fuel and 16,000 gallons of low-temperature oils per 24 hours. Continuity of town gas supply is guaranteed.

The site chosen occupies 37 acres, and is two miles east of Highland Park, in the township of Raritan, on the bank of the Raritan River, County of Middlesex, State of New Jersey; and the gas will be delivered into the mains of the Pubilc Service Electric and Gas Company to meet their increasing demands. It may be stated that the existing plant of 80 million c.ft. of gas per 24 hours will give, if necessary, up to 110 millions; but this is not sufficient, and if the above low-temperature carbonization plant is a success, others will be ordered.

The Kohlenscheidung Gesellschaft at Berlin was a Company founded by the late Hugo Stinnes; but some time ago the International Combustion Engineering Corporation acquired the control. A "K.S.G." retort has been in operation for several years at the Matthias Stinnes 1/11 Colliery at Karnap, near Essen, in the Ruhr; experimental work having commenced originally in 1919. The design is that of the long, rotary, mechanically continuous, cylindrical pattern, externally heated, and slightly inclined. Also a second smaller diameter cylinder is contained within; the crushed coal entering at one and, travelling through the inner cylinder, falling through perforations at the end, and travelling back along in the outer cylinder (representing the maximum heating zone). Both raw coal and residual low-temperature fuel are therefore discharged at the same part of the setting.

The length of the outer cylinder in the standard retort at Essen is 76 ft., and the diameter 10 ft., with 5 ft. 8 in. for the inner cylinder, corresponding to a throughput of 60 to 80 tons per 24 hours, with an overload of 100 tons. The speed of the retort averages one revolution in 90 seconds, while the total travel of the charge through both cylinders is approximately 2½ hours. The method of heating the setting is on different lines from ordinary practice. Apart from very accurate methods of temperature control, it consists in burning producer or other gas in a separate setting with only a slight excess of air, and then diluting (to give the setting temperature of 1112° to 1292° Fahr.—600° to 700° C.) not with air, but with recirculated inert waste gases from the chimney base. In this way there is practically no excess oxygen in the setting, and no corrosion of the retort.

Blending is also adopted in the case of strongly swelling coals for preventing the charge sticking to the retort. This, of course, depends on the circumstances, and in many cases is not necessary. However, with the particular gas coal of the Matthias Stinnes 1/11 Colliery, about 10 p.ct. of the low-temperature fuel breeze and dust is blended with the raw coal. This overcomes all the difficulties. For most bituminous coals, less is required. Also high-temperature carbonization coke breeze or non-coking coals can be used instead, while in some cases a small amount of steam, not more than 5 p.ct. by weight, is passed through the charge.

The most remarkable claim made for the Kohlenscheidung process is that very hard, free-burning, smokeless fuel containing 10 to 12 p.ct. of volatile matter can be turned out from small coal, and by a mechanically continuous retort having a large throughput, almost equal in quality, for example, to that of a small intermittent retort with pressure in the charge. This is obtained by sudden and rapid heating of the charge at one stage of the process, at the end of the inner cylinder, combined with the action of a jet of superheated steam, which apparently decomposes sufficient volatile matter to prevent any undue swelling of the charge. Blending also helps to overcome swelling. The system is contrary to most ideas of slow and progressive heating. The temperature of carbonization in the inner cylinder does not much exceed 392° to 572° Fahr. (200° to 300° C.), and then the charge suddenly falls into the hottest zone of all—that is, the corresponding end of the outer cylinder, which is at about 932° to 1022° Fahr. (500° to 530° C.), corresponding to 1112° to 1292° Fahr. (600° to 700° C.) in the combustion chamber. The rest of the carbonization is carried out in a declining zone slightly below 932° to 1022° Fahr. (500° to 530° C.) in a travel of about 1¼ hours.

INAUGURATION OF IMPROVEMENTS AT THE TUNBRIDGE WELLS GAS-WORKS.

Carbonizing and Coke Handling Plant.

On Oct. 12, the Mayor of Tunbridge Wells, Alderman C. E. Westbrook, opened new plant at the works of the Tunbridge Wells Gas Company. The guests of the Company, who included many local public men, were conducted round the works by Mr. L. J. Langford, the Engineer. Following the inspection, those present were entertained at tea by the Chairman and Directors of the Company.

Mr. H. A. Beeching (Chairman of Directors) said that this was the first occasion since 1910 that they had enjoyed a visit from their fellow townsmen. He extended a hearty welcome to the Mayor and others who had come down to assist in opening the new plant. They were pleased to see members of the Corporation and officials present. He knew they had another undertaking, but good feeling existed on both sides, and he might say that the gas lion could lie down comfortably with the electric lamb. The Prime Minister had stated that there was ample room for both gas and electricity to go forward side by side, with an enormous development of both. The gas industry stood on a pinnacle in public service, and he hoped the visit had shown them that the Company were trying to keep abreast of the times. There was, however, still more work to be done when they had the money. He believed the new telpher system would result in a still greater amount of coke being required. There had been a long-felt want which they could now supply. During the thirty years he had been a Director, the Company had made enormous progress. During the war and the strike they had to supply gas at an enhanced price, but it was now back to pre-war rates. The Directors were very satisfied with the way in which Messrs. Drakes, Ltd., the Contractors, had carried out the work. He paid a tribute to Mr. Langford, and said the excellent feeling which existed among the staff was in no small measure due to the co-partnership and pension schemes. They had been particular factors in the great progress of the industry.

The Mayor expressed thanks for the hospitality they had received, and for the enlightenment afforded them in the manufacture of gas. As a representative of the Corporation, he congratulated Mr. Beeching and his co-Directors on the progress of the Company, and the policy they had always maintained. They and the Lighting Committee had always worked in the friendliest relationship, and they could rest assured that such relationship would continue. The Company had an excellent Engineer in Mr. Langford. He was popular in the town, and a most valuable servant to the Company. They had, too, an able Secretary in Mr. C. F. Catt, and a most excellent staff, the members of which appreciated what the Directors did for them, especially in connection with the co-partnership scheme.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

AUTUMN MEETING.

The Autumn Meeting of the Association was held at the County Hotel, Newcastle, on Friday, Oct. 14—Mr. T. P. RIDLEY, of Newcastle (President), in the chair.

Several letters of apology were received, including one from Mr. W. Doig Gibb, who wrote that he was in the hands of a specialist, and had to take things quietly for a few weeks. Mr. Thomas Hardie regretted his inability to attend, not only because of the pleasure it would have afforded him to hear the Presidential Address (which would be specially good), but because of old associations and his desire to show in so slight a way his appreciation of the honour that had been done Mr. Ridley in electing him President. It was well merited for the work Mr. Ridley had done in the industry, not only in his native town, but throughout the country.

The PRESIDENT suggested that a communication should be sent to Mr. Doig Gibb expressing the hope that he would be soon in his normal health.

MEMBERSHIP.

The following were elected:

Members.—Mr. J. R. Bradshaw, Hartlepool; and Mr. L. H. Sensicle, Newcastle.

Associate Members.—Mr. L. G. Slack, Hartlepool; and Mr. J. H. Race, Bishop Auckland.

PRESENTATION OF CERTIFICATE.

The PRESIDENT handed to Mr. Robert Douglas, of Workington, a certificate in Gas Engineering awarded by the Institution of Gas Engineers, for the higher grade, first class. The certificate had the added merit that Mr. Douglas had obtained it with distinction. On behalf of the Association the President wished Mr. Douglas success in his future career.

PRESIDENTIAL ADDRESS.

Mr. T. P. RIDLEY then delivered his Presidential Address, which is printed *in extenso* on later pages.

Mr. DUGALD CURRY (South Shields) then proposed a vote of thanks to the President for his address, which he said had been greatly appreciated. The President had covered a wide and comprehensive range of subjects, which at the present time attracted the attention of the industry; and opinions which he had expressed would, the speaker was confident, receive the general approbation of those who had the responsibility of administering and managing gas undertakings throughout the country. They were fortunate in having Mr. Ridley as President at the present time, in view of the many important matters that would affect the gas industry in the near future. They were grateful to Mr. Ridley for the many services he had rendered, not only to the Association and the gas undertakings in the district during the coal stoppage, but to the industry in a national capacity.

Mr. H. E. BLOOR (York), who seconded, described the President as being among the few "top notchers" in the gas industry in giving his services. His more particular interests were on the commercial and financial sides; and his work was therefore behind the scenes, and not known. He did a tremendous amount of work, and got no reward except the knowledge of what he had done for the good of his fellows in the industry. The question of hiring or selling gas appliances to consumers was a difficult one. In regard to this, one man he knew was convinced that, so great was the necessity for preserving the efficiency and modernity of gas appliances, the companies should retain them in their own hands, and refuse to sell them. The contention was that, by hiring-out the appliances, they could replace them when they got out of date. There were many out-of-date appliances in use. Mr. Ridley considered the right method was to sell and get the consumers to keep their appliances up to date. If a consumer had an appliance and used it as long as it would hold together, it meant that he had got into a state of mind in which he was not willing to put down any more capital, and had a sneaking feeling that gas was going out. They should get the whole community into a different frame of mind from this regarding the industry. They should convince people that it was a marvellously up-to-date scientific industry—an industry which was not approaching an inglorious end, or any kind of end, but was going on to greater heights. If they could get the whole community imbued with this idea, they would be able to induce them to go on buying their appliances and keeping them up-to-date. He (the speaker) was out to sell the appliances, because the man who bought them regarded them with eyes of proprietorship, and would look after them.

THE PRESIDENT.
T. P. Ridley, Secretary and Commercial Manager of the Newcastle and Gateshead Gas Company.

The vote of thanks was carried with acclamation.

The PRESIDENT, in acknowledgment, said that if his address had interested the members, he was amply repaid.

"NOTES ON TAR PLANT."

A paper under the above title was then read by Mr. S. A. Wikner, F.I.C., of the St. Anthonys Bye-Product Works. This is unavoidably held over.

Subsequently the members visited the Bye-Product Works of the Newcastle and Gateshead Gas Company at St. Anthonys, and inspected the plant. Afterwards they proceeded to the Wallsend showrooms of the Company, where tea was served.

COAL AND BYE-PRODUCT EXPORTS.

COAL EXPORTS.

The total quantity of coal exported during August amounted to 4,257,381 tons, compared with 2184 tons in August, 1926, and 3,272,110 tons in August, 1925. The values of these quantities were: 1927, £3,539,834; 1926, £3422; and 1925, £3,159,952. Of these totals, gas coal represented, in August, 507,876 tons, as against 510,130 tons in August, 1925—the respective values being £395,219 and £459,156. The average value per ton in August was therefore 16s. 7·5d.

Up to the end of August this year, the total amount of coal sent abroad was 34,752,591 tons, compared with 18,973,654 tons in 1926, and 33,562,809 tons in 1925. The values of these quantities were: 1927, £31,937,827, 1926, £17,240,336; 1925, £34,537,380. The gas coal included in these figures amounted to 4,448,268 tons this year, as against 2,491,787 tons in 1926, and 4,494,150 tons in 1925. The values of these quantities were: 1927, £3,764,767; 1926, £2,032,988; 1925, £4,366,171.

GAS COKE.

The business in gas coke has been increasing. The quantity shipped in August amounted to 111,682 tons, compared with 2955 tons in August, 1926, and 96,518 tons in August, 1925. The values were: August, 1927, £110,977; 1926, £2931; 1925, £91,111. For the eight months ended August, the amount sent abroad was 514,480 tons; in the corresponding period of 1926, 383,395 tons; and in that of 1925, 368,027 tons. The values of these last three figures were: 1927, £553,843; 1926, £395,408; 1925, £453,771.

TAR PRODUCTS.

Only a small amount of business in benzole was done abroad during August. In the eight months of the year it has only reached 29,441 gallons, compared with 419,532 gallons in 1926. Naphtha also had a considerable fall; the eight months only claiming an export of 20,554 gallons, compared with 58,054 gallons in 1926. Regarding tar, oil, creosote, &c., the business has been on a larger scale. In August, 2,139,176 gallons were exported, compared with 1,537,126 gallons in August, 1926. In the eight months, however, there has been a considerable decline—only 25,068,424 gallons having been shipped, as against 32,989,278 gallons in the corresponding period.

SULPHATE OF AMMONIA.

Quantitatively the returns relating to sulphate of ammonia continue to show the improvement to which reference was made last month. In August, 24,371 tons were sent abroad, compared with 10,757 tons in August, 1926. The total for the eight months is 161,203 tons, compared with 133,958 tons in the same period of last year. Spain and the Canaries have been very friendly buyers. The quantity they have taken during the eight months of this year was 61,195 tons, which compares with 35,091 tons in the corresponding period of 1926. Japan has also been a good customer, with 49,242 tons during the eight months, as against 34,379 tons in the same period of last year.

PRESIDENTIAL ADDRESS: NORTH OF ENGLAND ASSOCIATION.

Mr. T. P. Ridley, Secretary and Commercial Manager, Newcastle-upon-Tyne and Gateshead Gas Company.

The last meeting of the Association took the form of a celebration of the Jubilee of the Association, and consequently all the speeches were in retrospective vein—except the last one, when Mr. A. F. Bezant, Editor of the "Gas Journal," urged that all in the industry should "look forward." As the first President of the second half of the centenary period, my remarks will not be retrospective, but will be on topics relating to the present and the future.

Raising Capital.

The present is an intensely interesting period in which to live and work in the gas industry. There are so many subjects, which will have very important bearings upon the future, being considered at present, that anyone who keeps in touch with them cannot fail to be deeply interested. I think the interest will in most cases extend to a desire to help—however small the ability or opportunity to do so may be—our national organizations in bringing the various matters to successful maturity. I do not know how we would get on nowadays without these organizations; if they had been created twenty years earlier, many restrictions under which we suffer to-day would not exist. We are, however, to have some new legislation with the object of relieving the industry of some of its unnecessary restrictions and limitations, so that it may be developed on fair commercial and competitive lines. The treatment of the gas industry by the Government during the war was most unjust. The great services which the industry rendered at the beginning, and during the whole period, of the war were rewarded by cutting-down the dividends payable to such an extent that market values have never recovered. The efficiency and development of the industry are largely dependent upon its ability to raise capital cheaply. After making due allowance for the difference in the value of money since 1913, the gas industry cannot raise capital at reasonable rates owing to the treatment received by it during the war. In the case of our own Company, £100,000 of ordinary stock was issued in February, 1914, at a price giving a yield of just under 4½ p.ct. To-day the same stock is quoted at a price which gives a yield to the investor of 6⅝ p.ct. This means that to raise capital by ordinary stock to-day would cost us in dividend £2⅛ more for each £100 of money obtained. The effect of this upon the finances, and eventually upon the price of gas, of an undertaking which is developing is, of course, very serious. The only way to resuscitate the confidence of investors in sliding-scale gas stock is to provide a reasonable minimum dividend while still maintaining the incentive of reductions in price of gas and consequent increases in dividend as a reward. Anything which will assist in raising capital cheaply will find its final effect in the price of gas. There are several items in addition to the minimum dividend—though that is the most important—which would help undertakings to obtain cheap capital.

(1) An increase in the proportion of the borrowing powers to the paid-up ordinary and preference capital.

(2) The removal of the present restrictions as to the proportion of capital which may be raised by the issue of preference stock.

(3) The allowance of larger reserves than present legislation provides. The larger the reserve, the more the investor will be attracted. The consumers would not suffer, inasmuch as dividends are regulated.

(4) Greater latitude in the methods of issue of stock, which will result in smaller expenses of issue and the realization of higher average prices. With wider facilities in this direction, much more could be done in the way of obtaining consumers and employees as stockholders—a thing which is much to be desired and ought to be developed. At the present time we buy stock on the market for employees, and allow them to spread the payment to the Company over a period. We have been successful with the staff, but not so successful with the workmen.

(5) For gas stocks to be quoted on the Exchanges at per £1 instead of per £100 without the undertakings having to go to the cost, and the shareholders to what they would probably consider the unwarranted inconvenience of having to send in their certificates to be exchanged for new ones, which would be necessary if a conversion from stock to shares were carried out. There is a precedent for quoting stock per £1 in the case of the Royal Exchange Assurance Company. Some time ago we made application to the London and Newcastle Stock Exchanges for such a quotation, but the application was declined. I believe among brokers doing gas business there is a good deal of support for the suggestion. It would undoubtedly make gas stocks more popular with small investors who do not understand that stock may be bought and sold in smaller amounts than £100.

Gas undertakings should also be allowed to hold shares in other undertakings. In this direction a useful precedent has been set by a section in the Staffordshire Mond Gas Act, 1927.

There are many directions in which such a clause would be of advantage to gas undertakings.

Purchase of Residuals.

The present limitation upon the quantity of residuals which a gas undertaking may purchase ought most certainly to be removed. At present some gas undertakings have no power to purchase residuals; and those who have such power are limited to the purchase of one-third of their own production, and then only from other gas-works. Our own case shows the inequity of the limitation. At present we have power to purchase tar to the extent of one-third of our own production. We have entered into a contract with a Colliery Company for a supply of a large quantity of coke oven gas which will result in reducing our own production of tar by a material amount—and, of course, with it a reduction in the quantity which we may purchase. The result will be that our bye-products works as such will be worked at a much greater cost per ton of tar distilled, for much of the plant must stand idle. Gas undertakings are commercial undertakings, and their activities should not be limited in the interest of any particular trade. On the contrary, every possible facility should be given to enable them to supply their gas to the public at the cheapest possible rate.

Method of Charging for Gas.

Another item with regard to which we require greater freedom is that of charges for gas. We require the facilities obtaining in the electrical industry for the introduction of block, two-part, three-part, and four-part tariff systems. Every consumer costs the undertaking certain sums for giving a supply of gas; and with the present flat rate system of charging, the large consumer is generally paying an undue proportion of such sums.

(1) The block system provides for a small quantity of gas per month or quarter to be charged at a price per therm which will cover the service or customer charge, and any additional gas to be charged at a lower rate.

(2) The two-part system provides a customer or service charge payable whether any gas be used or not, and the gas at a lower rate than the present flat rate.

(3) The three-part system provides a customer charge as in (2), a demand charge representing the cost of providing and maintaining the plant for manufacture and distribution of the capacity required by the consumer, and the gas to be charged at a still lower rate than in (2).

(4) The four-part system consists of a customer charge as in (2) and (3), the demand charge in (3) to be divided between the plant required for manufacture and that required for distribution for the particular customer, and then the gas to be charged at a low rate.

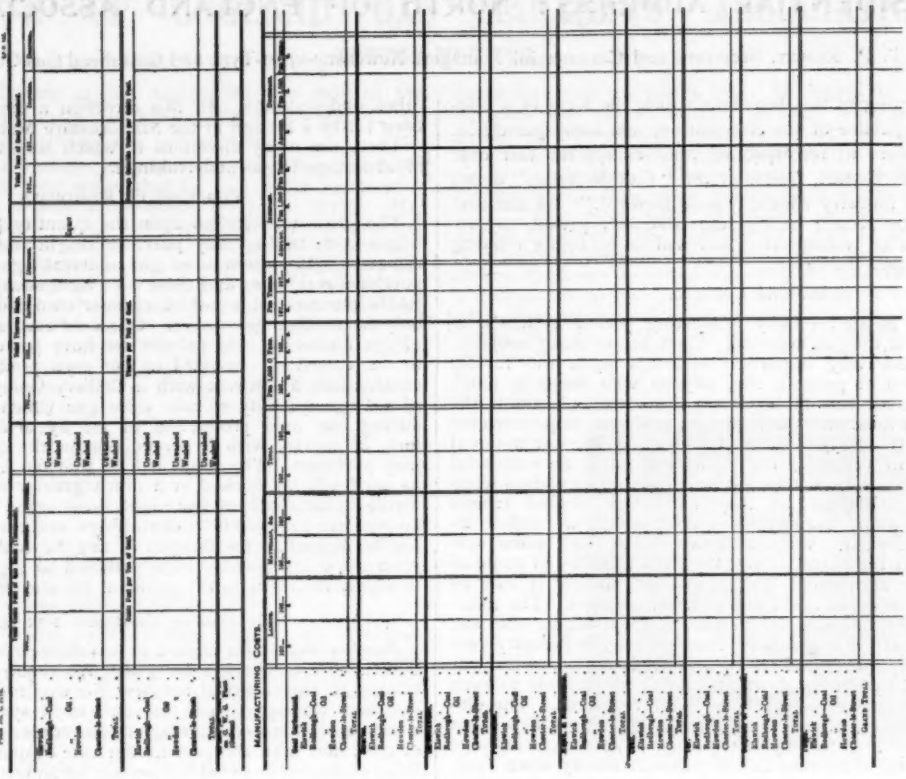
It can easily be seen that to go to the refinements of a four-part system is a matter involving great intricacy of calculation. A Committee of the National Gas Council has been investigating the subject for some time. It is well worth taking ample time to explore the whole subject in order to put before the industry the facts in such a form that each undertaking may be able to judge whether any, and if so which, of the systems referred to are advisable in their own particular circumstances. These systems have been introduced into America with great satisfaction. The Commissioners of various States—being the equivalent to our Board of Trade Director of Gas Administration—after having carefully studied and obtained experience of the working of these schemes have in many cases reported that they are the only equitable ones for charges for gas. That they are popular with the domestic consumer is shown from the following extract from the Year Book of the Baltimore Gas Company:

> When for all excess consumption over a stated amount the customer pays at a substantially reduced rate, self-interest impels him to use more service and take advantage of the opportunity to use the service for various conveniences, appliances, and comforts that he might ordinarily consider luxuries or extravagances, to be indulged in but seldom. . . .
>
> Perhaps the most notable feature of the Company's secondary rates is the resulting large use of gas for miscellaneous purposes about the home, in the shop, and in the place of business. The average consumption of gas per domestic customer has, as a result of the secondary rates, increased from a total of about 30,000 c.ft. per year to 51,000 c.ft. per year. . . .

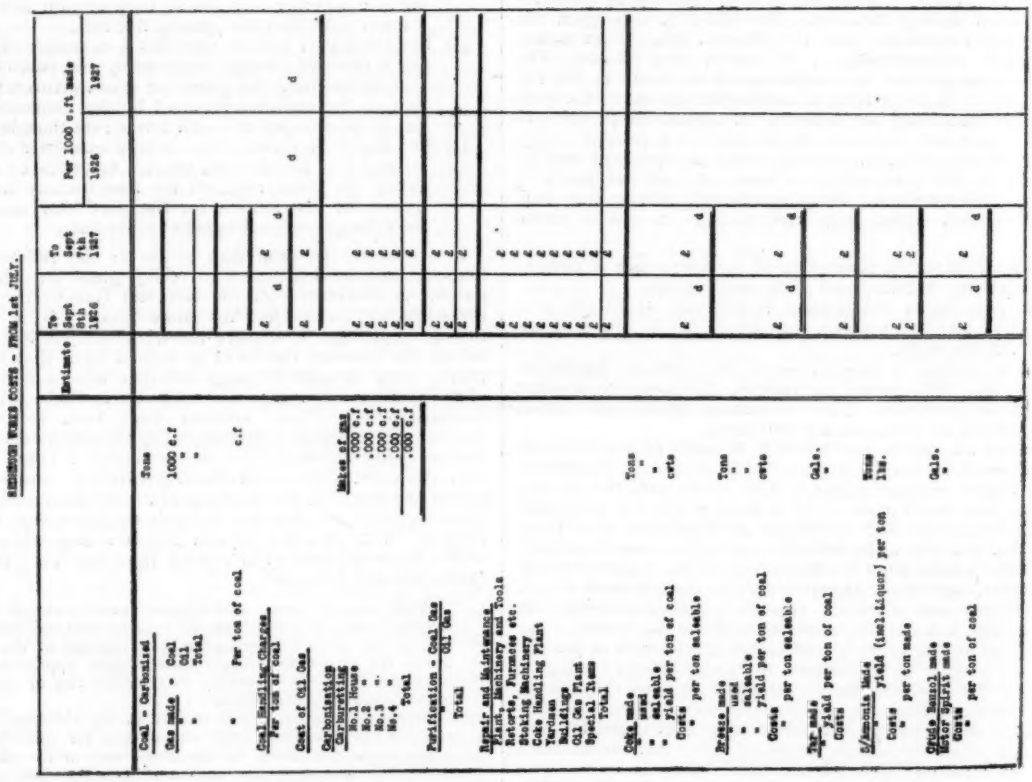
The introduction of such systems here will probably create opposition from local authorities. They will at first consider that the cost to the poorer citizens will under such systems be greater, on the basis that the poorer citizen is the smallest consumer, and the new systems mean higher cost to the small consumer. The smallest gas consumers are not necessarily the poorest people. This is illustrated in the Year Book of the People's Gas Light and Coke Company of Chicago by photo-

Form 2.

Accumulated Summary of Makes of Gas, and Costs of Manufacture and Comparison with corresponding period.



Form 1.



graphs of houses and figures of gas consumption. There is undoubtedly much industrial business which we cannot obtain at the present time owing to our methods of charging. If all consumers were charged their fair share of costs of service and demand, the gas could be sold at such a price to large consumers as would open out great fields for expansion, to the benefit of all. Such a system in a sliding-scale company will necessitate the substitution of the average price realized for the initial gross price for dividend purposes.

Costing Systems.

While most of the items to which I have referred so far are such as can only be accomplished through legislation, there is much that we can do ourselves with a view to lessening our costs and increasing our business by up-to-date methods and by service to the customer. It is the imperative duty of every gas undertaking so to organize as to produce and distribute gas at the lowest cost consistent with the quality supplied. It is therefore necessary to have costing systems which will give

quickly the cost of various processes and operations in fairly liberal detail. These are particularly useful where an undertaking has more than one manufacturing station or distribution workshop. In our case statements are prepared and submitted as follows:

Form 1. Manufacturing works costs to Wednesday evening are received by the Station Managers on Monday.

" 2. Accumulated manufacturing costs are circulated to Directors monthly.

" 3. Distribution and fittings costs for each distribution establishment, showing costs per job under numerous headings with comparisons with previous quarter, are circulated to Directors quarterly.

" 4. Monthly working results for all manufacturing stations, bye-product works, and distribution departments are circulated to Directors.

" 5. Monthly and accumulated income and expenditure results, and comparisons with estimates made at the beginning of each half-year, are submitted to the Board monthly.

Statements are also submitted to the Board showing the financial results of the bye-product works, the accumulated and prospective expenditure on capital, and the numbers of orders received for fixing and for the return of various gas appliances.

The Chief Engineer holds quarterly conferences on "costs" with the Station Managers and Distribution Superintendents.

We also print half-yearly for private use a book of statistics in greater detail than even "Field's Analysis," and with many coresponding periods, and find this to be a great saving of time to the officials in dealing with matters of policy.

All these statements involve a good deal of work; but as the members of the Board take a real and practical interest in the results, and as the statements are the means of keeping all departments in close touch with their results and of stimulating effort and efficiency, they are worth all the work involved.

Eliminating Waste.

It is surprising how unnoticed waste of materials and labour can creep into organizations—particularly where the price of the commodity can be put up to meet the cost. By reorganization in the distribution and fittings department, savings have been effected representing the equivalent of more than $\frac{1}{8}$d. per therm on our total sales. On some work our labour costs per job are lower than pre-war, notwithstanding the higher rates of wages payable to-day. The distribution and fittings department is one involving large expenditure, which, with the introduction of maintenance systems, is likely to increase. It is a department in which there is plenty of scope for the organizer and money-saver. To make a comparison per consumer of distribution, rental, collection, and distributive capital costs is most interesting; and it is these costs which bulk most largely in the consumer or service charge in the tariff systems previously mentioned. If you take the cost per consumer from the published accounts of a number of undertakings, you will see the variation is large—to the extent of many shillings per consumer. The total capital expenditure per consumer for companies shown in "Field's Analysis" ranges from £11 to £27.

Value of Machines.

Organization for the purposes of economy and efficiency should be applied in all departments, including offices. In our head office, by the introduction of machines for dealing with prepayment rental work, the ledger posting for 85,000 consumers is now done by five female clerks—an average of 17,000 consumers per clerk. For ordinary rental account keeping, machines are used for making out the accounts and at the same time the debit side of the ledger. Here again savings have been, and can be, effected. We use listing and non-listing Burroughs adding machines, the Hollerith sorting and adding machines, comptometers, cash registers, and addressing and "Protectograph" machines. Our dividend work now takes about as many hours as it took days prior to the introduction of machines.

Emergency and Efficiency Officers.

We have found it desirable for obtaining high efficiency and service to appoint on our clerical staff an emergency and efficiency officer. When any department has a special rush of work, or is getting behind with its ordinary work, or wants additional staff, he takes up work in that department, and thereby obtains first-hand knowledge of its efficiency, and finds out whether some alteration is necessary. Again, when complaints are received from consumers or others, with regard to delays in executing orders or attending to complaints, which show weakness in the organization, it is his work to find out the place of weakness and to recommend a remedy. This system has the added advantage that the capable members of the staff are more likely to be discovered and obtain promotion; and the success of any undertaking largely depends upon the promotion of staff by merit. When lack of ability is discovered in any officer, he should not be allowed to stand in the way of those more capable, even if it means a reduction of status for the less capable.

Amalgamations.

There is throughout the country a tendency to promote amalgamations of undertakings of all kinds, and to form large concerns. The Newcastle Company has moved with the times in this respect, having recently acquired two neighbouring Companies, and has at present an application before the Board of Trade for an Order authorizing the transfer of a third undertaking. These acquisitions will represent an increase of 45,000 consumers, or 35 p.ct. With regard to amalgamation of gas undertakings, each case must be taken on its merits. Clearly, amalgamations are neither to the nation's nor to the industry's advantage unless they benefit the shareholders and the consumers of both undertakings.

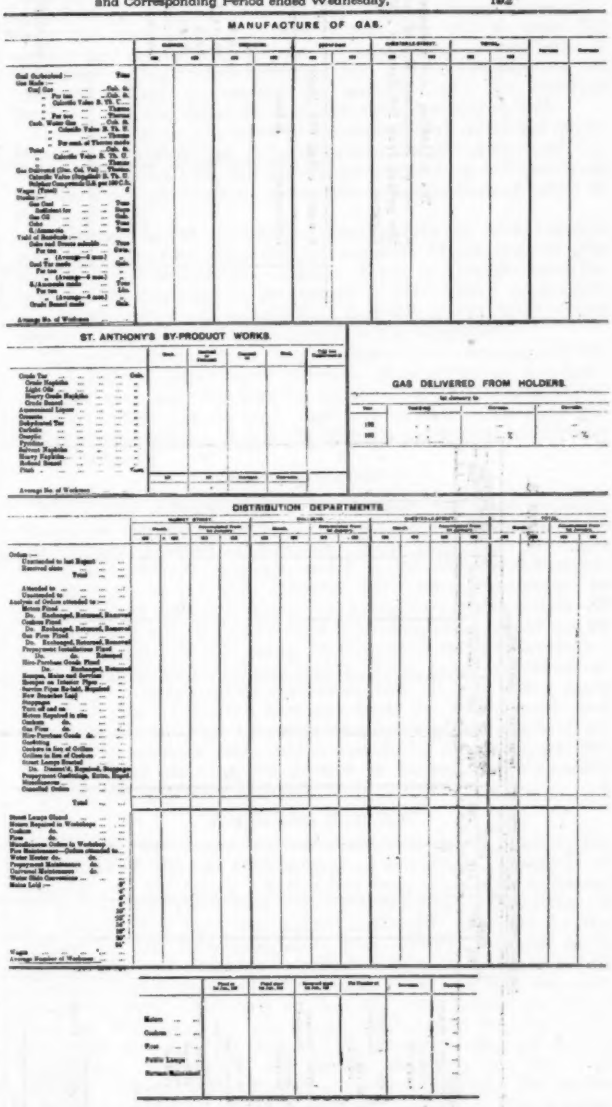
My Directors will not be parties to any amalgamations which do not provide advantages to the consumers of both the absorbed and absorbing companies.

PRIVATE.

Newcastle-upon-Tyne and Gateshead Gas Company.

Form 4

Working Results for the Four Weeks ended Wednesday, 192
and Corresponding Period ended Wednesday, 192



They will not agree to any arrangement under which their present consumers are to bear burdens to the relief of the consumers in absorbed areas. It must be to mutual advantage.

On the other hand, undertakings may become so large that there is great difficulty in placing at the head individuals who can so organize and maintain the operations that the highest efficiency is always obtained and maintained. Many very large commercial undertakings have recently found themselves in troubled waters by not having secured men at the head who could efficiently hold the reins of direction of teams so large.

After statements in the reports of the Colwyn Committee and the Company Law Amendment Committee to the effect that payment of capital and conveyance duties on amalgamations were unjust and acted as a deterrent to amalgamations, the Government has, by section 55 of the Finance Act, 1927, given relief. Previously the acquiring company was required to pay capital duty and conveyance duty on stock issued to the shareholders of the absorbed company, though the latter's stock had

Form 5.

INCOME AND EXPENDITURE

26th June 1927

The following is a statement shewing on most of the items the actual amounts accrued on Income and Expenditure for the four weeks ended 6th June 1927 and for the period from 1st January 1927 to the same date as compared with the estimated figures:-

	4 weeks ended 6th June			Accumulated from 1st January			
	Estimated	Actual		Estimated	Actual	More	Less
INCOME							
Gas							
Rental of Meters &c.							
Miscellaneous Receipts							
Coke							
Breeze							
Tar and Products							
Ammoniacal Products							
EXPENDITURE							
Manufacture:-							
Coal Oil etc							
Salaries							
Wages							
Purification							
Repairs & Maintenance							
Distribution							
Rents Rates and Taxes							
Management							
Amalgamation a/c and Leasehold Lands							
Depreciation							
Gross Profit							
Dividend and Interest							
Surplus							
Deficiency							

COAL OIL ETC. CARBONISED

	Estimated		Actual		Estimated		Actual	
	tons		tons		tons		tons	
Coal	"		"		"		"	
Oil etc								
Total	"		"		"		"	
	c.ft		c.ft	Gas made per ton	c.ft		c.ft	
	c.ft		c.ft	Gas sold do	c.ft		c.ft	
	therms		therms		therms		therms	

Form 3.

QUARTERLY COMPARISON OF REVENUE ITEMS - JANUARY/MARCH - WATER STREET

	1926	1927	1926	1927	1926	1927	INCREASE	DECREASE	Working Results 1926 1927
			£.s.d.	£.s.d.	£.s.d.	£.s.d.	£.s.d.	£.s.d.	£.s.d. £.s.d.
Gas Consumed Therms (A)									
Gas Meters fitted, 10 Lights & upwards									
do Under 10 Lights									
Meters exchanged - Ordinary									
do Prepayment									
Meters removed									
Fittings repaired in site - Ordinary									
do Prepayment									
Gas Cookers fitted by Company - Prepayment									
do Tenants									
Cookers exchanged									
do removed									
do returned									
Fittings repaired in site - Ordinary									
Gas Fires fitted by Company - Prepayment									
do Tenants									
do exchanged									
do removed									
do returned									
Fittings repaired in site									
Prepayment Installations fitted									
Fire Perchers goods fitted - Prepayment									
do repaired in site									
do exchanged									
do removed									
do returned									
Dredged up mains									
Service pipes renewed									
do repaired									
Stoppages									
Fire extinguishers									
Gas shut off									
Gasfitting									
Additional prepayment gasfittings									
Changes on private fittings									
Cooker in lieu of grille									
Grille in lieu of cooker									
Meters exchanged									
Street lamps erected									
do exchanged and repaired									
do discontinued									
do moved									
do repaired									
do stoppages									
Foreman Inspectors etc									
New mains									
Renewal of mains									
Renewal of service pipes									
Pumping, water out of syphons									
Intensifying pressure supply									
Insulating service pipes									
Governor House &c. at Gas Works Kirkhill									
do do Hallough									
do do Hawks									
District Governors - Gas									
do repairs etc.									
Oil Spraying plant									
Making Service pipes									
Meters repaired in shops - Ordinary									
do Prepayment									
do tested in shops									
do on site									
Prepayment do on site									
Depreciation - Meters									
Cookers repaired in shops - Ordinary									
Prepayment									
Depreciation - do Cookers									
Gas Fires									
Gas Fires repaired in shop									
Observing each main fires repaired									
Repair and maintenance									
Attendants									
Waterside Attendants altered and replaced									
Universal maintenance									
Multicoms-Prepayment installations									
do Inspectors wages									
do Tenants Workers									
Lamplighters wages									
Street lamps repaired in shop									
Repairs to mains									
Repairs to various properties									
Depot									
Manufacturing goods									
Preparing wages									
Water Vehicles-Running costs and repairs									
Transfers between works									
Sundry accounts									
Repair Street roadway.									

already borne capital duty. These duties represented to acquiring companies ¹d. per therm on the gas sales of the new area for a period of from 2½ to 4 years. The Finance Bill as submitted confined the relief proposed to be given to other than statutory companies; but thanks to the prompt action taken by the National Gas Council in conjunction with the Conjoint Conference of Public Utility Associations, this was corrected so as to include statutory companies.

Newcastle Price Unchanged by Coal Strike.

To be retrospective for one moment with regard to the mining dispute. We are proud to have been able, by competitive buying of foreign coals, quick disposal of commitments when the trouble seemed about finished, and good forward sales of tar products when prices were very high, to carry through without increasing the price of gas. It is true that we had to call upon our reserves, but that is one of the purposes for which reserves are created. As I have already stated, I feel that it would be to the advantage of gas undertakings and consumers alike if larger reserves than at present were allowed by statute. It would make for more uniformity of charge, and tend to prevent the big jumps in price which we have witnessed at times

when it would have been most desirable not to have had them. Good reserves are also desirable for keeping a company in a position to meet future competition or obsolescence of plant by reason of invention.

In this district the consumption of gas per consumer is very low compared with many other parts of the country. This is largely due to being a mining district where free coal is supplied to almost everyone connected with the collieries. The average of the three London Companies, according to "Field's Analysis," is 193·4 therms; in Newcastle it is 134·8, and Newcastle has not by any means the lowest consumption per consumer on the North-East Coast. The consumption per mile of main in London is 61,163, against 21,862 in Newcastle. This has an important bearing on questions of capital and administrative charges per therm, the excess sum per therm to be charged to prepayment consumers, and rating.

Rating Committee.

I am certain that the District and Central Advisory Committees on Rating which have been set up at the suggestion of the National Gas Council can be of very great value to the various undertakings. In our district the Committee has collected information from the individual undertakings which will be of the greatest value. It shows serious discrepancies between undertakings on almost every basis of comparison. Statutory undertakings are too highly assessed by comparison with ordinary industrial concerns. We ought not to expect to be assessed on as low a basis as a business with less certain profits; but the present differences, speaking generally, are too great, and we ought to take every opportunity to reduce the difference. The amount of the assessment is of much greater importance now than in pre-war days, because of the very high rates.

In view of the conference of the "B.C.G.A." last week at Southampton, and the paper which I gave upon "Local Publicity" at the conference last year in Newcastle, I do not propose to say much upon the question of selling gas except that we must all be most energetic and enthusiastic, and counter the propaganda of our rivals, who are this winter to renew their efforts to gain a larger domestic load. We in Newcastle have used methods which have been very successful in countering their efforts with individual consumers, and at the same time in capturing for gas, business for lighting, heating, and cooking which was already in the hands of our competitors. There is plenty of room for work, and there is plenty of competition. In the last six months we have sold 13,500 lighting pendants and brackets, besides obtaining large numbers of orders for cookers, fires, and various other appliances.

Gas in Industry.

The industrial use of gas offers an enormous field for useful work. It is a branch which requires staff with a great deal of specialized technical knowledge, enthusiastic interest, and patience; but in return very large consumptions are obtained, in the majority of cases with very little outlay to the gas undertaking. Even the humble boiling ring with a consumption of only 10 c.ft. per hour, if used during ordinary industrial working hours, adds over 24,000 c.ft. to the annual output; and single pieces of apparatus such as that inspected by members of the "B.C.G.A." in October last at a ship-repairing establishment are in use in this district with a consumption up to 12,000 c.ft. per hour. The cost of gas as a fuel is usually the first consideration of the user. This will vary not only with the price per therm but with the efficiency of the apparatus. It is essential therefore that all appliances offered to an industrial consumer should give the highest possible efficiency, and this efficiency must be maintained throughout their lifetime if gas is to continue to make satisfactory headway in competition with other fuels.

As there is no limit to the variety of industrial processes carried on in districts similar to Tyneside, many of which offer difficult problems, a fully equipped experimental test room is essential for carrying out tests with the necessary degree of accuracy. Special appliances have to be designed and built to meet exceptional trade requirements; and there should be facilities for building-up special burners and parts to meet these cases, also for giving the careful final adjustments to appliances to obtain the little extra success which enthuses the user. The undertakings should do everything possible to encourage industrial users to acquaint them of their troubles, and we should be prepared to undertake every class of overhauling and repairing, including the rebuilding of brick linings, &c., and the giving of the necessary advice and supervision in cases where customers are able to carry out the work themselves.

Gas can be successfully introduced into certain processes even when some other fuel is carrying out the bulk of the work. It is used for lighting-up and preheating coke and powdered fuel furnaces, and has recently been added to a large fuel-oil fired furnace—the gas being used to supplement the oil to give finally required even temperature. The sale of gas in the last-mentioned case is over a million c.ft. per annum. There is keen competition with oil in factories for heating processes, and with electricity for power; but there is still plenty of scope for gas. We need to get at the manufacturer's side and show him where he can use it. We cannot afford to wait till he finds out and comes to ask for the apparatus.

Sale or Hire of Appliances.

There has been discussion on the merits of sale and hire of gas consuming appliances; and in some quarters hire is recommended as against sales. In my opinion it is better, where such can be arranged, to get the consumer to put his capital into gas appliances, than for the Company to do so. The consumer is much more likely to take care of the appliance, and remain longer a consumer in that form of user, than if the appliance be the property of the gas undertaking and the consumer be at liberty to order the appliance to be taken away if he has some real or fancied grievance, or if he desires what he considers to be a nicer appliance which a neighbour has obtained. Last year, of the number of cookers fitted in our area, 22 p.ct. were sales, and of fires 45 p.ct. The hire principle fits in better with some maintenance schemes; but is it not better to make the maintenance scheme fit in to the existing conditions, if they are economic? We consider that our maintenance scheme must be universal—*i.e.*, we must maintain by periodic visits to every house all appliances, whether owned by the undertaking or the consumer, and without direct charge for inspection and cleaning. This is the only way to give full service and attain full efficiency of appliances—at any rate in industrial areas. With charges for periodic inspections of consumer-owned appliances, the majority will not contract for such, and the object in view will therefore largely fail.

One thing to keep in mind in connection with universal maintenance is to standardize as far as practicable the appliances—not only those let on hire, but also those supplied on hire-purchase and for cash—in order to keep down the numbers of parts to be stored.

Reverting to the question of hire, nearly all undertakings now let cookers on hire, but the majority of concerns in this district do not supply fires on hire. While I advocate sales for cash or hire-purchase in preference to hire where such sales can be effected, I am certain that business in gas sales is lost where a hire system for gas fires is not in operation.

The rentals charged for hire appliances vary enormously between undertakings—many of them at one end of the scale will not even pay the interest on the cost of the appliances, whereas others are so high that one wonders that they get much hire business. It is a pity there is not greater uniformity in the industry.

Monthly Accounts.

There was a suggestion a few months ago that accounts should be rendered monthly to all ordinary consumers, as is the common practice in America. Some consumers no doubt would like monthly accounts, and it is desirable for the undertaking to force monthly accounts with some consumers, in order to save bad debts; but as a regular practice with all consumers, I am sure we should find many who would not be pleased at the collector being so frequently on the doorstep—particularly if they realized that to have monthly instead of quarterly accounts would cost them over ½d. per therm more for their gas. I believe that our costs for rental work and collection are not high by comparison with other undertakings, and my calculations show that it would cost the consumer that amount, after allowing for interest on money received earlier than by the quarterly system.

Smoke and Pure Air.

Since the war many improvements have taken place in the conditions of life and environment of the people, especially in housing and sanitation. Action has been taken also to secure the provision of clean food. Yet the gross pollution of the air we breathe has not been taken thoroughly in hand by the authorities. In Newcastle more than one-third of the city's rightful share of sunshine is cut-off each year by dense clouds of smoke that form an effective barrier between it and the sun's life-giving rays. Not only so, but the very substances which form the filthy body of this smoke fell back on the city to the extent of 7400 tons in 1925. The Smoke Abatement Act of 1926 dealt mainly with the factory chimney, but the chief offender—the domestic chimney—was not affected. We maintain, and rightly so, that the practical solution of this problem lies in the use of smokeless fuels such as gas and coke; and the more the use of these is extended, the better it will be for the health of the community.

Interest in low-temperature carbonization and the production of oil from home coals continues, but the economic position is still uncertain. In balance-sheets showing the anticipated results from processes giving a smokeless solid fuel, the price expected to be obtained for the solid fuel is generally such as is not likely to be paid by the public. The gas industry, however, must take the broad view that they are not merely manufacturers and purveyors of light and heat and of residual coke, but are generally linked up with the whole fuel industry of the country. Close touch must be kept with the various processes, and assistance given wherever practicable.

Residuals.

The residual export markets at the present time are quite good, and stocks here are low. The export price of gas coke

is above that of patent oven coke, notwithstanding that during the mining dispute foreign patent oven coke got a strong footing in the gas coke markets. In the home market of this district, competition with patent oven coke nuts is very keen. The producers of this coke supply a very good article, have motor fleets for delivery in the city, and exercise most enterprising salesmanship. For some purposes their coke is at least as suitable as gas coke; and it comes to questions of cleanliness and price. This means that we must take greater care in preparing our coke for the market, because suitability tells even more than price. The Newcastle Company have greatly improved their quality of coke by the use of coal with small ash content, blending coals, and screening, grading, and cutting the coke. We are endeavouring to extend the use of domestic coke and coke stoves, and are making experiments in various selling systems. The small coke boiler is a growing business, evidence of which is shown by the advertisements in the "Ironmonger." In a recent issue, no less than 23 advertisements of coke stoves appeared. Dealing with this business has created a desire among our sales representatives for greater knowledge in the science of heating; and therefore arrangements have been made for a course on heating and ventilation to be carried on for them at Rutherford College this winter. The Company will assist in fees and text books. As coke ovens increase, their competition will become keener in coke oven districts; and other places more remote are likely to get the same competition in their home market eventually. It therefore behoves all to do their utmost to make coke of the most suitable character, and to develop the use of coke stoves.

With regard to tar and tar products, the markets for many of these are most variable. In pitch there is a tremendous amount of speculation on the part of dealers. It is not desirable that the price should reach too high a level, as such attracts the shipment of American pitch to our natural markets across the North Sea and the Channel, and also leads the consumer to look for substitute fuel. Again, with regard to creosote it is undesirable for the price to soar, if we are to hold the American market. Our mining dispute created a shortage and consequent inflation of prices, which has caused America, by far our largest customer, to increase her own production. Thus it is essential that steps be taken to increase the sale of creosote in other countries. The only way to do this is by propaganda.

Benzole is not only a product of our tar distillation, but we find in our horizontal retort works it is profitable to recover by washing the gas for crude, refining same, and marketing through the National Benzole Company, whose costs for distribution are very low. By producing benzole we reduce the importation of petrol, and thus assist the national trade balance. The petrol contained in "National Benzole" mixture is that of the British Petroleum Company, and therefore wholly a British product. With regard to road tar, the British Road Tar Association has now been officially constituted, thanks to the persistence of the National Gas Council and the unofficial Committee which has done such good work during the last two years. The work done by this Committee includes advertisements and articles in many technical journals, display of exhibits at many suitable exhibitions, papers at conferences, and laying of experimental lengths of road. They also arranged a luncheon in London in July, at which the Press were present, when an important letter from Lord Balfour on the use of British tar was made public. The gas and coke oven industries are under a deep debt of gratitude to Sir David Milne-Watson for all he has done for the British Road Tar Association.

There is much essential work yet to do in order to establish tar in its rightful place against imported materials for roads. Local authorities ought to patronize the home-produced article. The Managing Council of the Association is a representative body, and is capable of doing excellent work; and I trust that all gas undertakings will give it full support, and that the coke oven owners will do likewise.

The profits on sulphate of ammonia are, as we all know to our sorrow, very much less than before the war. The price is less than the pre-war figure, and the costs are about double. For small works there will not be any profit, yet they must continue to manufacture, because they cannot otherwise get rid of the liquor. Countries which in pre-war days were good customers for our production are now competitors in other markets. The world's production has increased enormously, and the consumption has not increased at the same rate. But for the existence of the British Sulphate of Ammonia Federation, the financial results must have been infinitely worse than they have been. I believe that the marketing arrangement with Nitram Limited will be for the general good of the trade. There are great possibilities of increasing the world's consumption, and more propaganda is the need.

Great Progress Under Difficulties.

Since the end of the post-war boom, the sales of gas on the North-East Coast have been wonderful when it is realized—as it is only realized by those living in the district—what a terrible depression has covered the district during the last six or seven years. Only last month the Chairman of the Finance Committee of the Newcastle Guardians stated that, on the average, one in twelve was on relief from the Guardians. In some other areas in this district the position is probably worse, and yet during the last few years we have had progressive increases in sales of gas. When the depression passes, we may look forward to still greater business. As a district we are dependent on the coal, iron, steel, shipbuilding, and engineering trades. If the shipbuilders and engineers are to obtain orders in competition with foreigners, they must have their steel at low prices; and the British steel maker, if he is to supply them with steel at low prices, must have his coke at low prices. It all comes back to coal. The coal trade is in a bad way from the points of view of both owners and workpeople, inasmuch as in Northumberland and Durham the trade is being carried on at a substantial loss on average to the owners, and large numbers of miners are working short time—many not at all.

On the other hand, the foreigner is now beginning to feel our competition in coal. Our exports are expanding; but this is only being attained by great sacrifices, entailing in many districts very heavy losses—particularly in Northumberland and Durham—and it is difficult to see how far the struggle for existence will or can be carried. The coal trade is going through a critical period: and it can only get through it by reverting to a competitive position, by reduced costs per ton, which can be so greatly helped by increased production. The test will probably do more for the economic efficiency of the industry than anything else.

With regard to the iron and steel trade, it has struggled against great odds since the war. The world's producing capacity has gone up by over 40 p.ct. Works here are being carried on at no profit or at a loss owing to the competition of other countries. We are unable to compete not only abroad, but also at home. The foreigner is dumping his goods on the North-East Coast at prices lower than our costs of production. If we can secure the home market, we shall be in a much better position to compete in the export market; it is an axiom in the steel trade that the only way to lower prices in the long run is to increase output, owing to the high capital cost of plant.

The shipbuilding and engineering trades are certainly now employing more men; and it is hoped that the orders to keep them employed will continue to be forthcoming. However, at least one-third of the shipbuilding berths of this district are empty, and several yards have been entirely closed for the last few years. While we have our problems in this part of the country, the other great export trade—the textile industry—is also having its troubles; and heavy losses have been incurred during the past six years.

Exports.

The general trade of the country is better than it was, and prospects are brighter; but the public do not fully realize the position in the export trades. We are the greatest coal exporting country, and yet we are the only one of the great coal-producing countries which is producing less coal than pre-war. Between 1923 and 1926 the nation's imports of iron and steel grew from £14 millions to £29 millions, and this year they are at a very much higher rate. In the first six months of this year, 2½ million tons of iron and steel were imported into this country. If this quantity had been made at home, how many more men in the coal, iron, and steel industries would have been employed, instead of being on the dole? How much better our national trade balance would have been. In 1913 we exported to India 2800 million yards of cotton piece goods. Last year we sent only half that quantity; and the same thing is happening with regard to China. Our visible adverse export balance which in the first half of 1913 was £78 millions, was £209 millions in the first half of this year. Our exports in the first half of this year were 30 p.ct. below our 1913 standard, taking increased values into account. Our annual national and local expenditure is three times more than before the war; rates and taxes per ton of finished steel are over £1 per ton. One local Coal, Iron, and Steel Company paid in rates before the war approximately £30,000—last year the amount for the same Company was £120,000. A shipyard calculated pre-war rates as £550 per ship; in 1924 they were estimated at £4400 per ship. With regard to railway rates, in Poland coal is put on board ship 300 miles distant from the pits for 4s. per ton; for the same sum in this country the distance would be less than 30 miles. Our competitors pay much lower wages, and are taxed and rated considerably less than we are, and in some cases have Government assistance and help in the rate of exchange.

Mr. George Hicks said the other day that England has the best brains and the best workmen in the world; but how are they to compete successfully abroad against the conditions I have just enumerated, and how is England to continue to feed an industrial population if she cannot compete in her export and even her home trade?

Economy Essential.

We must have national and local economy. The Government and municipalities must realize that there are many things which in themselves are desirable, but which we cannot afford, and therefore we ought to do without them; but there appears to be no endeavour by many to do without anything. There should be expenditure only on absolute necessities. Other

things should wait until national and local taxation is reduced; otherwise we shall find ourselves lacking capital, and shortage of capital is the root of unemployment. Many local authorities must have no idea how their reckless expenditure is strangling the industries of their districts by making costs such that the industries cannot compete abroad, and also cannot prevent the importation of goods which belong to our export trade—thus creating more unemployment. With regard to wages, those of the sheltered trades are much higher than in competitive trades, and ought to be brought nearer to those of the latter, until there can be a general increase. At the present time the high wages of sheltered trades make matters still worse for their fellows in the competitive trades. The Railway Companies have their troubles too, but they must find a way of reducing their charges on industrial consignments. Their present charges are crippling industry.

There must also be a new spirit of co-operation in industry. There must be greater output for the wages paid. This does not mean lower wages, it means more output for the wages paid. Wages should be closely related to the work performed by the individual; in this I am a great believer. Let us have co-partnership by all means, but let us also have wages according to work done. In some statistics collected by a Committee on this subject, certain work done on piece rates in 150 hours, took on time rates 490 hours; and other instances of a like kind could be quoted. The average wage of piece workers is higher than time workers, and yet the costs per unit of output are less. These figures show that there is much room in many industries for reduced costs of production and higher wages to the worker by payment by results. It is only human nature that a man will work harder if his earnings are thereby directly increased.

Inefficiency the Foe of Prosperity.

It is gratifying that evidence of a better spirit in industry is not wanting; and in this lies our hope. We must have efficiency from top to bottom in every industry; and full efficiency cannot be attained without co-operation. Every man whether in low or high position who shirks his work inflates the prices of materials and reduces employment. Inefficiency is the greatest foe of prosperity. This applies not only to those engaged in the competitive trades, but to everyone in every trade including our own. We must have efficiency. Employers and employed need to get together in each industry and adopt every device to obtain efficiency and economy. Thus shall we regain prosperity in our district—and as a speaker said last week at the opening of the Efficiency Exhibition in Newcastle, "When the trade of the North-East Coast is happy, the whole nation is happy." In view of the progress made by the gas industry during the period of depression, we can with a return of prosperity to the district look forward with confidence to still greater success.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Annual Meeting.

The Annual Meeting of the Association took place at the Linacre Gas-Works, Liverpool, on Oct. 15; about 100 members attending. They assembled at the offices, and were received by Messrs. R. E. Gibson, M.Inst.C.E. (Engineer and Manager), E. Astbury (Assistant Engineer), S. Carter (Works Manager), W. Norris (Assistant Works Manager), and the new President, Mr. F. B. Small.

Mr. Gibson, on behalf of the Directors of the Company, welcomed the members, and said that the Linacre Works were a combination of old and new. There were four other works, in addition to the Duke Street Offices and Distribution Department.

The party then inspected the works, a description of which follows this report.

Tea.

Tea was provided in the recreation room by the Directors of the Company; and at its conclusion,

Mr. Gibson expressed regrets that the Chairman of the Company, Mr. H. Wade Deacon, J.P., was unable to be present. Mr. Gibson said they appreciated the visit of the Manchester Juniors. The work of the Association was of great educational value, and many of his staff were members. He mentioned that Liverpool had once again supplied them with a President; Mr. Small being the third from that undertaking.

Mr. J. T. Haynes (Bolton), moving a vote of thanks to the Directors of the Company, said that the Liverpool Gas Company held an important place in the industry. At an early date in their career they established a name for straightforwardness and consideration in their dealings with their employees. They were enthusiastic supporters of the principle of co-partnership; and the development of good relationship between the staff and the workmen had always received encouragement from the Directors. The magnitude of the works had been a revelation to many; and the diversity of plant and scope in the various processes must have made all juniors envious of the opportunities offered on such a works. He was sure all would agree that the Company were to be congratulated on their very fine works at Linacre. He had great pleasure in proposing that the best thanks of the Association be given to the Chairman, the Directors, Mr. Gibson, Mr. Astbury, and Mr. Carter.

Mr. Cook (Southport) seconded the vote of thanks, to which Mr. Gibson briefly replied.

Business Meeting.

The Hon. Secretary (Mr. J. Alsop) read the annual report, which showed there were 229 members and three honorary members. During the year eleven new members had been admitted, four had been transferred to other Associations, there had been one death, and six had resigned, leaving the membership as it was last year.

The Hon. Treasurer submitted the balance-sheet, which showed a credit balance of £22.

Mr. Robinson (Altrincham) renewed his offer of a prize for the best paper given during the session.

Mr. Bridge (Elland), in moving the adoption of the report, mentioned that the Western Junior Gas Association and also the Scottish Junior Gas Association (Western District) had joined the British Junior Gas Associations; and they had hopes that the other Scottish Association would follow, and thus complete the circle. The Institution of Gas Engineers had now appointed District Education Committees, which were intended to help all potential students. Mr. Alsop, of Bolton, was the Hon. Secretary of the Lancashire District Education Committee; and he asked them to write Mr. Alsop about any difficulty they might have, and give full particulars of (say) courses taken, previous examinations passed, results obtained, work done during the last two or three years, and courses proposed to be taken, &c. It was up to the Juniors to do their share. All had been done that could be expected of the Institution of Gas Engineers; and they hoped that now there would be plenty of men coming along to take full advantage of the facilities offered.

Election of Officers.

The following officers were elected for the session:

President.—Mr. F. B. Small.
Senior Vice-President.—Mr. W. H. Battersby.
Junior Vice-President.—Mr. H. J. Hailstone, A.M.I.Chem.E.
Hon. Secretary.—Mr. J. Alsop.
Hon. Treasurer.—Mr. I. H. Massey.
Auditor.—Mr. J. H. Cadman.
New Members of Council.—Messrs. H. B. Knowles (Lancaster), T. H. Williams (Crewe), A. D. Young (Burnley), and J. Albinson (Manchester).

Presentation to Retiring President.

Mr. T. Duxbury (Oldham) was asked to make the presentation to the retiring President (Mr. Battersby); and in doing so he spoke in high terms of the work accomplished during the last session. He referred to the address Mr. Battersby gave upon entering his year of office.

Mr. Battersby briefly responded.

Mr. Duxbury then presented the prize awarded by the Council, and given by Mr. J. Robinson (Altrincham). Mr. Caldwell, of Widnes, was the recipient, and his choice was "The Distribution of Gas," by Walter Hole.

Mr. Carter moved a vote of thanks to the officers and Council for the work done during the past session.

Introduction of President.

Mr. Battersby then introduced the new President, Mr. F. B. Small, who proceeded to deliver his address.

PRESIDENTIAL ADDRESS

of Frank B. Small, of Liverpool.

You have this day done me an honour in raising me to the office of President; and I trust that I will in no way betray the faith you have placed in me. I have chosen to speak of the Association's interest in the younger member, and to show that the Association, by possessing such an interest, is of value to the gas industry. The adjective "junior" in the title of the Association does not refer to the age of the member. Nevertheless, it is an Association of which juniors may, and are encouraged to, become members; and while they are sought, it is the duty of the older members to aid them in their career. To a great extent this duty is carried out.

Many hours have been, and are being, given to debate on the best means whereby the status of the gas engineer may be made more dignified than it is at present. This alteration can only be brought about by attacking the problem through the potential gas engineer, by giving him the necessary help and impetus to go forward. The reward we older members hope to receive will be the satisfaction of seeing the gas industry

placed on a pedestal equal in height to those of other engineering and scientific industries.

The amount of help available is only limited by the amount of help sought; and while we older members are laying ourselves out to assist the younger, the latter must lend a hand to aid themselves. To sit at home and answer questions that are going to be assessed at so many marks out of 10, with perhaps an extra 3 for neatness, though necessary for the purpose of examination, is dry and uninteresting; but to prepare a paper to be read before a body of people is exciting and exhilarating, and, what is of more importance, is of high social value. For to make onself of use to any one particular society is to make oneself of use to every society.

The old adage, "Keep your ears open and your mouth closed," applies not altogether to the student, but to the man who knows, and knows he knows. The junior, or, perhaps a better term, the student, will be well advised to talk as well as listen, for to talk means that he must have observed, and having observed must be interested in his subject.

The Association provides ample facilities for the student's advancement; visits to gas undertakings other than those where the student is employed; to works that provide gas manufacturers' materials; to works dependent upon gas for their existence; to works which are dependent upon the bye-products of the gas industry—all these visits are of paramount importance; they are educational, mind broadening, and socially helpful.

Again, practically every visit is concluded by a paper by a member either of the Association or of the staff of the particular undertaking inspected. The paper having been read, a discussion upon its substance takes place. Here it might be better if the younger member took more part therein and the older member less. It so often happens that two or more members, well versed in the subject under discussion, will speak thereon in highly technical phraseology, with the result that those who would have spoken in more elementary terms, but with probably as much purport, remain dumb. If it could be so arranged that the younger member spoke first and the older member last, vastly more good would accrue. It is the fear of the demon Ridicule which binds the tongue; and it should be known that no such demon exists within the Association.

At the end of the session, the proceedings of all the Junior Associations are bound together in one volume, making a valuable book of reference; for not only are all types of industries described, but the papers read during the session, together with the discussions upon them, are given.

The foregoing shows the advantages—educational, intellectual, and social—a student obtains by being a member of the Association; yet all these advantages could not be provided if it were not for the generous and unstinting help of a large field of industries allied to, and dependent on, the gas industry. The gas undertakings themselves have in many cases recognized the value of the Association, and have gone so far as to frank the expenses of members in their employ, to enable them without pecuniary loss to undertake the programme of visits. This favour, together with allowing time off from duty, is a kindly action; and kindly actions usually reap their own reward.

Education Scheme.

It was originally the Junior Gas Associations who desired to launch a scheme whereby the status of the gas industry would be raised to the dignity of kindred industries. This desire was fathered by the Institution of Gas Engineers in conjunction with the help of H.M. Inspectors of the Board of Education. The scheme takes the form of a set of courses extending over a number of years, from what is termed the Ordinary Grade, to the Higher Grade, and finally the Diploma.

The testing of intellect by examination may not be ideal, but a course of study is essential to an ambitious student who is desirous of occupying a position of responsibility; and until some other method is invented, examinations are bound to remain the final means of assessing ability.

The organization of these courses in technical schools in connection with the Institution of Gas Engineers has occasioned many difficulties. The relatively few students available in any one district and the variety of subjects necessary in such courses render it a matter of great difficulty for technical schools to arrange complete courses for gas engineers in any but the large centres. To the student in the small centre exists a handicap that it is hoped will be removed at the earliest opportunity. In all new schemes faults occur, but it is a pity that the student becomes part of the machinery by which the scheme is tested.

Not only is it expensive to travel from a small centre to a large one, but it is tiring. Rush home to the evening meal; hurry to class in time for the commencement of the lecture; sit through it digesting the quickly eaten meal rather than the subject of the lecture; return home "fagged-out," too tired to enjoy the sociability of the home life . . . and so to bed! This, three days per week must eventually bring about something like a revolt within the weaker, and even the normal, student; for not only is he rising early and retiring late on three days, but the remaining three evenings will be occupied with homework.

There is another type of student who is not well catered for under the scheme—he who is employed direct from the elementary school at the age of 14 as a labourer. He may have one of two faults, or both. The first is that, through a lack of foresight, he did not choose the proper type of parents at birth—parents who could have afforded to have sent him direct to a secondary school or college. His second fault is that his intellect did not mature early enough, and it is only after leaving school, and sobering down, that he begins to be interested in things. In other words, he becomes ambitious, and wants to improve his position.

At first he attends classes in elementary sciences and mathematics, and as time goes on becomes proficient in the higher stages of these subjects; but there is little hope of his ever reaching the standard required by the Institution of Gas Engineers—*i.e.*, the Matriculation Examination, or its equivalent. He may be far above the standard required in his science subjects, but will not be able to tackle the English or the foreign or dead language. A training in English is essential; but the English required by examining bodies is of too high a standard for the requirements of the Institution of Gas Engineers. While it might be fair to expect it of a student who has had a higher school education, it is unfair to impose this standard upon a student whose school life has been spent in an elementary school where little English is taught, and no foreign language. The English required by every student entering upon a career is that which enables him to express himself clearly in words and writing. These qualities can be achieved while the student is attending his evening classes. His English will improve longside his science subjects. He will learn how to express himself clearly when answering questions orally in the classroom, or in writing at home.

It is to be hoped that the high standard of qualifications required by the Institution of Gas Engineers for the bottommost rung of the ladder will be somewhat modified. Other criticisms of the scheme, of a more technical character, might be made; but the two mentioned, on account of their appearing at the commencement of it, may be regarded as the most important for the present.

Remuneration.

During studentship and afterwards the question of remuneration will be constantly cropping up. The student will naturally want to know whither all his studies and privations are leading him. If through studying he has helped to achieve the wish of the Association, and has assisted in placing the industry higher in the esteem of other industries, he will expect some reward other than that of a pious wish; but it is outside the sphere of the Association's activities to offer anything else. The Association might do something of a concrete nature, and bring pressure to bear on undertakings who use the "state salary expected" clause. This type of advertisement forces the applicant to offer his intellect and body to the sacrifice of invert auction—a most unmoral and degrading situation.

The work of the Association might be extended in one or two other directions—*e.g.*, the establishment of an employment bureau. To such a bureau members wishing a change of situation could send their requirements, together with their experiences and qualifications; and undertakings could send particulars of any vacancies occurring. In this way an introduction might be brought about which would be beneficial to both parties. Such information would, of course, be treated with utmost confidence.

Another venture could be the formation of an information bureau, as suggested by Mr. Dixon in his presidential address in 1922. He suggested the formation of a Committee to deal with difficult situations that may arise during a day's work, and to deal with general questions.

The success of this scheme would depend greatly upon the members themselves. If it met with no response, it would fail through sheer apathy; and if apathy were a complaint within the Association, it would have dissolved years ago.

Mr. Fletcher (Garston) moved, and Mr. Heald (Preston) seconded, a vote of thanks to Mr. Small for his address.

LINACRE GAS-WORKS.

The Linacre Works of the Liverpool Gas Company comprise three coal gas plants—"North," "South," and "Experiment Works"—and a carburetted water gas plant. Their respective capacities are 6,000,000, 9,800,000, 200,000, and 10,000,000 c.ft. per day, giving a total capacity of 26 millions per day.

North Works.

The coal is received by railway or canal. The railway is a branch, at high level, of the London, Midland, and Scottish Railway's line to Alexandra Dock; and on it coal is received in wagons, generally with bottom doors from which it is discharged into chutes leading to breakers, or carts, or motors, as required. Coal arriving by canal is discharged from the barges by jib cranes, with 15 cwt. "Priestman" single chain grabs, steam driven.

The works consist of three retort houses set parallel to the canal and to each other. Each house contains two benches. The west house has twelve beds of 8's, throughs, 22 ft. by 24 in. by 18 in. ⌂ section; each retort having two 7-in. ascen-

AN AERIAL VIEW OF THE LINACRE WORKS OF THE LIVERPOOL GAS COMPANY.

sion pipes which lead to hydraulic mains of ample section. The maximum charge is 18 cwt., and its duration 8 to 10 hours; the men being on three 8-hour shifts.

The middle house contains eight beds of 10's, throughs, 22 ft. by 24 in. by 18 in. ⊃ section. Maximum charge and shifts are the same as in the former house.

The east house has twelve beds of 8's, of the same dimensions and sections as in the west and middle houses. Maximum charge and shifts are also the same.

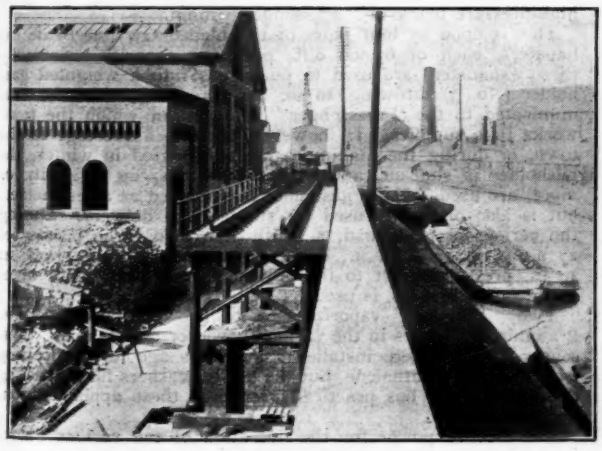
All settings are heated by regenerative furnaces at one side, with the main flue under the centre of the bench. All are charged with coal from overhead hoppers by Fiddes-Aldridge electrically driven machines; and the coke is discharged into De-Brouwer hot coke conveyors, which in the case of the west and middle houses deliver it under water sprays to end hoppers, from which it is drawn into bottom-opening trucks on a light railway, thence to the C.W.G. plant by a travelling steam jib crane with tipping gear, or, alternatively, in the case of the west house, to self-tipping skips of a Temperley transporter, whence it goes into the C.W.G. bunkers, or to wagons, or to stock, according to requirements.

corrugated iron roof, is constructed without lutes, and fitted with a Weck valve on 30-in. connections. The gas passes through four wet station meters set in parallel (two of 65,000 c.ft. capacity and two of 45,000 c.ft.), through two rotary washer scrubbers containing gas oil, for removing naphthalene, and thence to a 42-in. mixing main leading to the inlet of the gasholders.

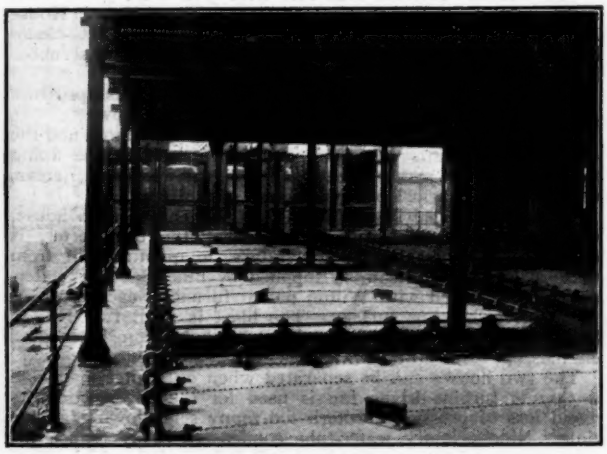
South Works.

The coal is received by canal; the barges being discharged by three jib cranes, steam driven, and fitted with 15-cwt. "Priestman" single chain grabs. Each is capable of handling 16 tons per hour. The coal is discharged into auto-weighers over crushers, through which it passes, and is then elevated to the hoppers.

There are two retort houses, Nos. 1 and 2. No. 1 House has 16 beds of 8's, in two sections of eight beds each of Glover-West continuous vertical retorts, the coke from which is removed in self-tipping skips by telpher either into screens and hoppers, or to the stock in the yard. The installation is designed to carbonize 450 tons of coal per day.



The Canal Wharf.



Purifiers at the South Works.

The coke from the middle house is conveyed to the other end of the house, up an incline, and direct into large overhead bunkers, under which carts or motors may be loaded.

Experiment Works.

These works are used for testing coal in 100-ton lots, and have four beds of 6's, single retorts, 10 ft. by 23 in. by 16 in. ⊃ section, charged by a Morris hand-operated "scoop" machine. When a test is being made the gas goes through separate condensers, exhauster, tower scrubbers, washers, purifiers, meter, &c., to the test holder, so that all the data necessary concerning tar, ammonia, calorific value, &c., can be obtained.

Ordinarily the gas joins the main stream of the North Works gas which passes through six sets of atmospheric pipe condensers, or two water cooled condensers, two "Cyclone" tar extractors, and six tower scrubbers in two series of three. Three Donkin two-bladed exhausters of a capacity of 200,000 c.ft. per hour each are used to propel the gas through two "Standard" rotary washer scrubbers to two sets of oxide purifiers. One set of four is water luted, with hydraulic valves; the purifiers, which are elevated and housed, each measuring about 50 ft. by 30 ft. by 5 ft. 6 in.

The other set of four, built in the open, and covered by a

Two waste-heat boilers have lately been added to this plant. They are of the Kirke type made by Messrs. Spencer Bonecourt, and each is capable of taking the waste products from four beds, and evaporating 500 lbs. of water per hour. The waste gases are drawn through the boilers by a Turney turbine and a De Laval geared turbine.

No. 2 House has 29 beds of 6's, 20 ft. by 23 in. by 16 in. ⊃ section, with one 8-in. ascension pipe to each retort. The charge is 10½ cwt., and the duration 8 hours. The men work three 8-hour shifts. The beds are arranged in four benches of 8, 8, 5, and 8 respectively; the hydraulic mains on the first, second, and fourth benches being in two sections. These retorts are charged by Fiddes-Aldridge machines; the coke being received into self-tipping skips, and removed by telpher to quenching tanks, and thence to crushers, screens, and bunkers, or direct to the stock in the yard.

The coal for No. 1 House is received from the grab into an auto-weigher, and is passed into either, or both, of two breakers of 30 tons per hour capacity driven by a 27 B.H.P. Crossley gas engine and a 35 B.H.P. "National" gas engine. Gravity-bucket conveyors deliver the coal into bunkers over the retorts. The capacity of the whole length of bunkers is 600 tons.

The coal breaker of No. 2 House has a capacity of 40 tons

per hour, and is driven by an electric motor of 20 B.H.P. The coal is raised by an 18-in. bucket elevator, and conveyed by a 24-in. push-plate conveyor extending up to the middle of the house. This conveyor is fitted with sliding doors for distributing the coal in the bunkers. A Babcock & Wilcox tray conveyor takes the coal from the end of the push-plate conveyor, and feeds the second half of the house; suitable tipping gear being mounted to deposit the coal where required. The bunker hoppers are continuous, and have a capacity of about 500 tons.

Each bench of retorts in the South Works has its own retort house governor, so that a good working pull (about 3 in.) can be maintained, and the sections balanced separately. The gas, after passing through two water-cooled condensers, is drawn through eight sets of atmospheric pipe condensers by three Bryan-Donkin exhausters, four bladed, steam driven, each having a capacity of 250,000 c.ft. per hour. Thence it passes to three Livesey washers, and three " Standard " rotary washer-scrubbers—one of 3 million and two of 2 million c.ft. per day capacity. The latter are generally used for cyanogen extraction by the Davies-Neill process; liquor containing sulphide of iron being circulated through them. Finally, two " Kirkham " standard centrifrugal washers are used in parallel to remove the remaining ammonia, and the gas then passes along a 30-in. main to the purifying plant. This plant consists of sixteen elevated boxes with connections above the ground. Two sets are housed, and two sets are in the open covered with corrugated iron roofing. Each box measures 46 ft. by 32 ft. 6 in. by 5 ft. 6 in. They are constructed without lutes, and are fitted with Weck valves on a 30-in. main. Two water-luted catch boxes, 39 ft. by 25 ft. by 6 ft. 3 in., are set on the ground in the open.

The gas is measured by three meters—two wet, of 125,000 c.ft. capacity, and one rotary of 100,000 c.ft. The latter is in the open.

The gas then passes through two rotary washer-scrubbers containing, as in the case of the North Works, gas oil for naphthalene removal, and then on to the 42-in. mixing main at the inlet of the holders.

C.W.G. Plant.

This is comprised of nine sets of Humphreys & Glasgow superheater plant, the total capacity of which, making carburetted water gas, is about 12 million c.ft.; making lower grade gas brings this amount down to about 10 millions. The " Old " House includes four sets with 9 ft. 6 in. generators, and two sets with 8 ft. 6 in. generators. The " New " House has three sets with 9 ft. 6 in. generators fitted with auto-cleaning roller grates operated by hydraulic motors. The scrubber is dispensed with in this section.

The steam pressure is 110 lbs. per sq. in.; blast pressure 18 in. and cycle at present 6 min. run and 3 min. blow.

A dust interceptor on each set between the generators and the carburetter prevents coke dust and ashes entering the fixing chambers; while safety interlocking gear, air-blast, steam meters, and electrical pyrometers are also fitted.

Coke, as received in the hoppers at the end of each house, either from the light railway cranes or the transporter, is charged by bogies into the generators, in quantities of from 6 to 10 cwt. The steam is supplied by nine Babcock water-tube boilers, fitted with Wilton patent furnaces, each of about 1827 sq. ft. heating surface. The blast is from two No. 10 Sturtevant blowers, belt driven by Bellis & Morcom high-speed engines.

The two houses can be separated when on winter load, and a 55 H.P. turbine-driven fan is used for the new section, to avoid loss of pressure through too many sets blowing at one time. Nine primary water-tube condensers easily reduce the temperature of the gas to about 95° Fahr., after which seven sets of air-cooled condensers reduce it to atmospheric temperature. The gas is then passed through two filter boxes, each 10 ft. square by 5 ft. deep, loaded with graded clinker, coarse at the bottom and finer at the top. The relief holder has a capacity of about 70,000 c.ft. The oil storage tanks, into which oil can be received from rail, road, or canal, have a total capacity of 4700 tons.

In the machinery house are the usual oil, tar, liquor, and boiler feed pumps, with a sunken settling tank and overhead cisterns for tar and water close by. Three pairs of Donkin exhausters (one pair 120,000 c.ft., one pair 100,000 c.ft., and one pair 80,000 c.ft. per hour capacity) and two Donkin direct-driven units of 75,000 c.ft. capacity propel the gas to the purifiers, on the way to which it passes through a battery of one " P. & A." and two Carter's " Hurricane " tar extractors, where the last traces of tar fog are removed. There are eight purifiers in four sets, all elevated. Three sets of two are water luted, with hydraulic valves and 30-in. mains, measuring 32 ft. by 26 ft. by 5 ft. 6 in., and are housed. The remaining set of two consists of luteless boxes measuring 48 ft. by 34 ft. 6 in. by 5 ft. 6 in., and are served by a modification of the Weck valve. These are in the open; being covered only by a corrugated iron roof.

The gas is measured by a station meter of a capacity of 175,000 c.ft. per hour, and by a Thomas electric meter installed by Messrs. Humphreys & Glasgow. This, though having a capacity of 600,000 c.ft. per hour, is scarcely larger than the 24-in. main in which it is inserted. The gas is heated through a fixed and constant range by an electric heater.

If the specific heat is constant, the quantity of heat, and therefore power thus introduced, is a measure of the gas flow. This energy is measured by a watt-meter calibrated to read directly in cubic feet.

The means of regulating the temperature difference is by using two electrical thermometers, one before and one after the heater, each connected with a delicate galvanometer. The needle of this galvanometer is in balance when the thermometers are of equal resistance; the thermometer at the outlet of the heater being 2° Fahr. warmer than the inlet thermometer.

Tendency for the temperature to change owing to the variation of gas flow upsets the balance of the galvanometer, and the deflected needle is used to operate a rheostat regulating the current supplied to the heater, so that, by an arrangement of gearing with pawls operated by magnets energized more or less according to the position of the galvanometer needle, the rheostat is automatically regulated.

The stream of C.W. gas now enters the 42-in. mixing main from which the combined streams of mixed gases, representing the total works make, can be distributed as desired between the two sets of gasholders—viz., Nos. 1 and 2, or Nos. 5, 6, 7, and 8. The eight holders have a combined capacity of 9 million c.ft., a proportion of which is delivered direct through balanced governors on to the six main districts at the North end of Liverpool, including Bootle, Walton, Seaforth, and Waterloo. The remainder is pumped to the Athol Street and Eccles Street works, and, when required, through Athol Street to Garston, for aiding the south end of Liverpool, through a high-pressure trunk or " messenger " main.

This is done by four pairs of two-bladed Gwynne-Beale exhausters, each of 63,000 c.ft. per hour capacity. Normally these exhausters are used to pump gas into a weighted gasholder (No. 3) throwing 10 in. back-pressure, which is communicated to the " messenger " main, from which the town works take supplies. If, however, there is a shortage in the town, or during the maximum pressure period in winter, the gasholder is shut-off, and higher pressures, up to 42 in. or more, are used. No. 4 gasholder is employed as a test holder, but is also ordinarily used for storage and delivery. During the periods of peak load, a Keith-Blackman turbo booster of 27 B.H.P. at 1200 R.P.M., delivering 600,000 c.ft. per hour at 10 in. pressure direct to the governor inlet main, with automatic safety by-pass, is used.

Two " Simplex " vaporizers in the booster house, and five " atomizer " sprays in the various governor outlets and " messenger " main, were installed some years ago for minimizing trouble from naphthalene, but the use of washers for extracting the naphthalene has practically rendered these appliances unnecessary.

The electric power for the operation of the various plants is direct current at 220 volts, and is generated on the works. The power house contains three dynamos of 40½ KW. capacity, directly connected by flexible couplings to three 60 B.H.P. " National " gas engines; and two dynamos of 52·8 KW. capacity coupled to two 80 B.H.P. " Keighley " engines. Over forty electric motors from 20 down to ⅛ B.H.P. are used on the works.

Sulphate of Ammonia.

A Simon Carves sulphate of ammonia plant deals with the whole of the Company's ammoniacal liquor, and is capable of manufacturing 25 tons of salt per day.

Midland Association of Gas Engineers and Managers.—The autumn general meeting of the Association will be held in the Grand Hotel, Birmingham, on Thursday, Oct. 27, at 2.30, under the presidency of Mr. F. C. Briggs, of Dudley. Certificates will be presented to the following successful candidates in the Higher Grade Examinations in Gas Engineering and Gas Supply of the Institution of Gas Engineers: Messrs. F. L. Atkin, C. E. Stoddart, J. E. V. Cæsar, R. L. Greaves, and D. J. Ward. Mr. C. F. W. Rendle, of Redditch, will read a paper on " The Application of Auxiliary Producer Gas Firing to Waste-Heat Boilers; " and Messrs. C. M. D. Belton, G. S. Eunson, A. W. Smith, and G. Stevenson will take part in a discussion on " What is Done Free for Gas Consumers on the District."

Gas Companies' Protection Association.—The thirtieth annual general meeting of the Association will be held in Caxton Hall, Westminster, on Tuesday, Nov. 1, at 3 o'clock, when the report of the proceedings of the Association and the accounts for the year ended Sept. 30 will be submitted.

EXPERIMENTS ON THE VENTILATION OF SMALL BEDROOMS.

Report before the "B.C.G.A." Conference at Southampton, Oct. 3.

By A. H. Barker, M.Inst.C.E., B.Sc.

The report on these experiments needs a few preliminary words defining the object for which they were undertaken.

As is well known, the results of recent physiological researches have entirely altered scientific opinion as to the function of ventilation. Until a few years ago the view generally held was that the need for ventilation arose from the fact that the breathing of air produces carbonic acid vitiation, a diminution of the oxygen content of air, and other effects which were believed to make the air unfit to breathe. A supply of fresh air was regarded as necessary in order to supply new oxygen and to remove carbon dioxide.

The results of researches in this country, in Germany, and in America appear to prove that this view is erroneous, and that the true functions of ventilation are physical rather than chemical—namely, to effect the removal of the surplus body heat, and with that object to keep down the temperature and humidity, and to maintain air movement. Further objects are to reduce dust and germs, and to suppress, or diminish, smell.

Experiments have been made on the effect on rooms full of students of supplying them with entirely fresh air on the one hand, or entirely with recirculated and reconditioned air on the other—that is, by circulating the same air to the room over and over again, and on each recirculation cooling it, removing the dust, dehumidifying it, and keeping it in movement. The surprising result was secured that, as far as could be seen, there was practically no difference between the hygienic effect of reconditioned air and of fresh air at the same temperature and humidity. If there was any difference observable, the results were in favour of the reconditioned air so far as could be detected in the few weeks in which the observations were made.

The effect of these conclusions has had very undesirable reactions on the general opinion of the importance of fresh air in ventilation. They have been seized upon by some ventilating engineers to justify large reductions of both fresh air supply and heat in inhabited buildings, substituting for an adequate supply of heat and fresh air such devices as locally fixed stirring fans, punkahs, and so forth, in order to increase the cooling power.

There have been exponents of ventilation who have condemned forced ventilation altogether on the ground that it is expensive and unnecessary, and that natural ventilation by open windows can safely be substituted for it in almost all cases, especially in schools.

Various interests have advocated the total suppression of chimney flues in the bedrooms of housing schemes on the ground that a large supply of fresh air is unnecessary, and that its function may be served by a small grating leading to the outer air. It is this latter conclusion I wish especially to discuss.

However much we may agree or disagree with these extreme interpretations of the results, it will be evident that they leave the subject of ventilation, considered as a practical art or science, in a nebulous state. They do not provide us with any definite numerical standards of good ventilation, except certain doubtful figures relating to wet bulb temperatures and Kata thermometer readings. Indeed, they seem to indicate that such standards are purely arbitrary. Physiologists of eminence have laid down at least four different factors of air which are of importance, all of which vary widely under natural weather conditions; but the human body is so adaptable to its surroundings that it is impossible to lay down any definite specification of good or bad ventilation. Constant change is said to be desirable. In investigating the effect of different room conditions, therefore, one is labouring under the great disadvantage that there are no definite standards to which to work.

I have taken a good deal of interest in the condition of an ordinary dwelling house, as regards heating and ventilation; and I was desired by your Council to investigate from the point of view of the practical ventilating engineer, and in the light of the results of these researches, the effect of an ordinary chimney flue on the internal conditions, chemical and physical, which modern hygienists regard as criteria of good ventilation. As has been said, all these conditions are in their very nature extremely variable. Most of them are very difficult to measure accurately. It is impossible to maintain any of them constant in an ordinary room. Meticulous accuracy of observations in such conditions is merely a waste of time. These facts make a definite pronouncement in such an investigation a matter of extreme difficulty. A test, however accurately conducted, on one single occasion, or on one room, has only a small significance where the conditions may be, and almost certainly will be, altered on every future occasion on which a similar test is made.

That any short series of such experiments can be completely conclusive is obviously impossible. To make them entirely convincing, the same experiments should be repeated on many different rooms for a period not of months, but of years; and much more should be known of the ultimate physiological effect of different conditions than appears to be known at present. However, it is in the hope that a record of one such series conscientiously carried out may be of interest that I present this paper.

I hired a suitable small bedroom in a working-class house, and arranged it so that it could be used as a bedroom in a number of different conditions, both with and without a flue, and with and without either gas or electric heaters. Three persons were induced to sleep in this room under these various conditions every night for a month, and constant observations of the condition of the air in the room were taken throughout each night.

The following observations were taken at two-hour intervals throughout each night:

(1) The carbon dioxide impurity.
(2) External and internal temperatures, wet and dry bulb.
(3) External wind movement.
(4) Internal air movement.
(5) Wet and dry Kata thermometer readings.
(6) Amount of dust.

The three persons inhabiting the room recorded their feelings each morning. In addition to this, outside observers, after a drive of several miles through the fresh air in an open car, paid regular visits early every morning to the room in which the experiments were being made, to record their impressions of the condition of the air in the room as judged by the sense of smell by a person coming straight in from the open air. It will be seen that these observations comprise most of the factors which modern hygienists regard as criteria of the perfection of ventilation.

Arrangement of Room.

The room was of 1300 c.ft. capacity and was provided with an ordinary fireplace connected to a 9-in. chimney about 20 ft. high to the top of the chimney pot. The window (size 6 ft. by 4 ft.) faced in a southerly direction. There were two walls exposed to the street, and one door, and the room contained two beds, in which three clean, healthy young men slept every night. The observations were very carefully taken, and the samples of air collected by my laboratory assistant, Mr. James Nicholls, who has been most assiduous throughout in circumstances of great discomfort.

Series I.—For the first few nights the chimney flue was completely blocked-up with impermeable paper pasted over and varnished. The window was closed, the cracks were puttied-up, and the room made as airtight as it conveniently could be.

The next few nights observations were made in the same conditions but with the window open 3 in. at the top, the next nights with a 6-in. opening, and a fourth with the window 12 in. open, corresponding respectively to 1, 2, and 4 sq. ft. of free opening to the fresh air.

Series II.—The obstructions in front of the chimney flue were removed, and an exactly similar set of observations was taken with the flue open; every other condition being the same as in Series I.

Series III.—The flue was closed, and the room was warmed by a small electric stove, and the same observations were repeated.

Series IV.—The chimney flue was again opened, a small gas fire was put into the fireplace, and the observations were repeated a fourth time, everything else remaining the same. The observations were then co-ordinated and compared and plotted on diagrams.

Results of Tests.

It would be out of place in a brief descriptive paper such as this, even if it were possible, to give numerical details of this very large number of observations. They will be published elsewhere for those who are interested in such matters. I can here quote only the general results briefly, and record the impressions made upon my mind by a perfectly impartial study of them.

Series I.

(a) *With no heat, no chimney, and with all the apertures closed.* The carbon dioxide increased during the night from about 4 parts per 10,000 at the beginning of the night to about 27 parts per 10,000 in the early morning. This observation proves that the rate of interchange of air was in round figures about 300 c.ft. per hour per person occupying the room. The total interchange was two-thirds of one interchange per hour, in spite of all the apertures having been made as airtight as possible. This represents, of course, leakage through the ceiling, the walls, the door cracks, and the like, due to the pressures induced by temperature variations.

(*b*) When the window was opened 3 in., the increase of carbon dioxide during the night was from 4 to 20 parts per 10,000, giving an interchange of about once per hour, with roughly 400 c.ft. per person per hour.

(*c*) With the window opened 12 in., the increase in CO_2 was from 4 to 11, showing about 2¼ interchanges per hour, or 1000 c.ft. per person per hour.

Humidity.

In all the series the observations of the humidity (of which the figures will be given in the complete report) agreed generally with the carbon dioxide observations. That is to say, when the window, the door, and the flue were blocked up, there was a great increase of humidity as measured by the rise of the dew-point and of the relative humidity. With the flue closed the window was always streaming with moisture. The rise of humidity was checked when the window was open, but was always considerable. Several of the days were wet; and in these cases the relative humidity was, of course, more pronounced still. The worst case showed well over 90 p.ct. of saturation.

Observations were also made with the Kata thermometer both wet and dry. These observations agreed with the temperature and humidity figures, leaving no doubt of the substantial accuracy of the general result. In the most unfavourable conditions observed, the Kata thermometer observations showed a cooling power of rather less than 5 on Dr. Leonard Hill's scale, and the wet Kata varied from 11 to 16 in millicalories per sq. cm. per hour.

The smell and closeness were very unpleasant. Indeed, with the window shut it was almost intolerable. It was less offensive the wider the window was open. All the occupants, who were accustomed to a healthier manner of life, contracted severe colds and complained each morning of headache, stuffiness, and general discomfort.

Series II.—With the flue open and the window and door shut, the rate of increase was from 4 to about 11; thus showing that, even with the window shut, the draught of the flue drew in as much air as with the window open and the flue blocked. With the window open, this figure was reduced, the decrease being approximately regular as the window was opened wider. During the later tests, the external wind, which had been previously almost still, increased considerably; and this tended to increase the interchange.

The last readings obtained with the window 12 in. open was from 5 to 6 parts per 10,000, which corresponds to an interchange of approximately 6 to 8 times per hour, and a supply of air to the occupants of about 2700 to 3500 c.ft. per head per hour.

The well-known smell of bedroom air was only slightly noticeable even when the window was shut. It was hardly perceptible when the window was even 3 in. open; while when it was 12 in. open it could hardly be detected at all.

Series III.—This was carried out with the flue again blocked, and a small electric fire using ½ unit per hour. The general results were similar to, but slightly better than, those of Series I. The curious effect was observed with the window open that the carbon dioxide increased to 14 parts per 10,000 in the early part of the night, and subsequently dropped to 11 parts. This effect was apparently caused by two facts:

(1) That the gradually increasing temperature in the room increased the natural interchange.

(2) Variations in wind velocity during the night. The greater the wind velocity the greater was the interchange.

Series IV.—This was conducted in exactly the same way, but with the chimney flue open and with a small gas fire in the fireplace; the gas consumption being regulated so that the same heating effect was provided in the room as with the electric radiator. In this case the maximum recorded carbon dioxide was 8 parts per 10,000 with the window closed, giving an interchange of about 4 times. The minimum recorded with the window 12 in. open was about 4·5. The effect of the gas fire was approximately to double the interchange as compared with an open flue without a fire.

Cost.

Comparing the cost of the electric with the gas fire, the cost of the five units of electrical power used through the night was 6½d., while the corresponding cost in gas was about 3½d. The interchange of air with the gas fire and the window closed was 3 to 4 times that with the electric fire in use, the flue closed, and the window open 3 in.

Dust.

These observations were taken with an Owens dust counter, which projects the dust from a measured quantity of air on to a sticky plate. This retains the dust particles, which can be subsequently counted under a microscope. The results in this case are that the amount of dust appeared to be approximately inversely proportional to the interchange of air; thus indicating that a uniform amount of dust is probably generated and distributed, and is regularly removed by the ventilation. The observations, however, were not sufficiently precise to enable this theory to be fully substantiated. Roughly speaking, it was found that there was about three times as much dust observed in the air with the flue closed as with it open—the conditions being otherwise the same.

Movement of Air.

The movement of air was taken at first by micro-anemometers—the same instruments which I designed for investigating some years ago the ventilation of the House of Commons. The readings with these instruments were found so irregular that no definite results could be obtained. I subsequently introduced streaks of ammonium chloride smoke into the room, and observed its movement with a scale and stop-watch in the usual way. It was, however, impossible to detect much difference in the results in the body of the room, except near the firegrate and near the open window. The observations were most instructive as giving an idea of the directions of the currents; but they cannot be briefly described. It has been necessary to give these results in the briefest manner because of the short time available, and because, if they were given in detail, it would be impossible to grasp their full import by hearing them read. I will therefore arrange to publish them in full.

An Analysis of the Results.

In analyzing the results, it will be seen that the primary effect of the chimney flue is to increase greatly the rate of interchange of air in the room as compared with the same conditions in which the flue is closed.

In the case of this room, the flue increased the interchange of air between two and three times; conditions being otherwise identical. All the other observed effects are simply the consequence of the increased interchange, and could be calculated if all the factors were accurately known. These are the lowered humidity, the reduced temperature, the reduced quantity of dust, the reduced smell, and the increased Kata thermometer readings. With the flue closed, the window glass was always streaming with moisture. It was always dry with the flue open.

One very important observation was that during the time the flue was closed all the occupants suffered from colds in the head, and unanimously complained of headache—so much so that I feared daily that they would refuse to continue to sleep in the room under these conditions. This effect disappeared entirely when the flue was open. The smell of stuffy bedroom air was distinctly more noticeable to a person coming in straight from the open air when the flue was closed than when it was open. Indeed, it would have been easily possible for a blindfolded person to detect from the feeling of freshness alone, even with an open window, whether the flue had been closed or open throughout the night, by merely walking into the room and sniffing the air.

When both the flue and the window were wide open, and when there was a small gas fire in the grate, the freshness of air and the CO_2 analysis in the room were practically indistinguishable from the outer air; only the temperature being raised. It was distinctly stuffy with the flue closed, even when the window was wide open, using an electric radiator equivalent to the gas fire in heating effect.

These facts have to be considered in a practical manner in relation to the habits of the population, for it is a general custom of the poorer portion of the population to close bedroom windows because of an absurd inherited belief that there is something poisonous or deleterious in night air; possibly also for the purpose of keeping up the temperature and increasing the comfort when the bed clothes are scarce and thin.

To get an idea of what the average habits of the inhabitants of small cottages are, I made a practice of driving round in a car early every morning through many miles of streets of houses of different classes in the neighbourhood where the experiments were being made, including two of the large housing estates which the London County Council have recently erected. On some occasions I took two observers with me, one of whom counted the total number of windows on the first floor (which were presumably all bedrooms) in each street, and the other the number of the same windows which were open.

The results of these observations were striking. They showed clearly that the general habit of the population is to sleep with the windows closed, even in moderately mild weather. It was noticed that, in the rooms where blinds or curtains were drawn, very few windows were open—approximately one in twelve. These observations include not only working-class property, but also property of the better class. The time when the working-class population gets out of bed, it appears, is about 7 or 7.15, for at that time the blinds were generally drawn up. Most of the windows were opened at about 7.45 a.m. After that hour, at least half of the windows counted were open—many of them wide open.

It may therefore be concluded that in general the custom of the working population is to sleep with the windows closed, and to open them, if at all, only when they get up. Now if all this working-class residential property had been erected without chimney flues, it is clear that the condition of the air in the rooms would have approximated to the worst observed in my experiments.

Rent is such an important item in a working-class budget

that one may be sure that all bedrooms are occupied to capacity. There will probably be in most working-class rooms at least three persons occupying every bedroom, and often more.

It is well known that, if a person becomes accustomed to sleep in " fuggy " and stuffy air, he does not experience any discomfort. The general experience probably is that, where bedclothes are scanty in quantity (as they often are among the poorer sections of the population), it will be more comfortable to sleep with the window closed, because this causes a rise in temperature which makes the inadequate quantity of bedclothes unnoticeable, while the consequent " fugginess " of the air is not felt except by a person coming in from the outside air.

I do not believe that if the chimney flues were omitted it would result in a general opening of bedroom windows, except during warm weather. How detrimental to health it may really be to sleep constantly in a " fuggy " smell of bedroom air I am not prepared to say, or whether, and how far, a low temperature may be of advantage. These are matters for the physiologists, who it must be confessed do not seem to have any very definite information on the point. But it appears that unless one can reverse the opinion which has always been held that interchange of fresh air in a bedroom is a desirable condition, it is impossible to justify the construction of working-class property without flues.

I am far from saying that no bedroom without a flue can be healthy and sweet. I believe it can be, but only if the window is kept wide open. These observations have satisfied me that a bedroom with a flue, even with a closed window, is fresher than is a bedroom without a flue, but with a window slightly opened. The best of all the ventilation results is secured by an open chimney flue with a small gas fire. Even with a closed window, nothing is to be feared from the condition of the air if there is a flue. Building by-laws often specify that, if a room is built without a flue a small external grating, whose size is often specified in relation to the cubic capacity of the room, must be supplied instead. This provision is really useless, apart from the fact that the gratings are so small as to be practically without value. Any uninformed person who is cold, or who has the opinion that night air is dangerous, will always block-up such an opening with newspapers or otherwise. They will also stop-up by similar means an ordinary fireplace flue. The important point about the fixing of a gas fire in the grate is that it increases the difficulty of stopping-up the flue.

Such are the opinions I have formed from this interesting but arduous, restless, and uncomfortable series of experiments. Though they extended over about a month, they are really too short to be entirely convincing or conclusive; but the results were so definite that I believe that if the tests were extended similar results would always be secured.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

Opening Meeting.

The Opening Meeting of the twenty-fourth session was held in the Royal Technical College, Glasgow, on Saturday, Oct. 8.

Mr. James Hall (Past-President), in introducing the new President, Mr. Robert Fife, of Kilmarnock, stated that he richly merited the confidence of the members, and would doubtless uphold the dignity and prestige of the Association.

PRESIDENTIAL ADDRESS

of Mr. Robert Fife, Kilmarnock.

It was only the combined efforts of the Juniors which effected the revision of the Institution's Scheme of Education; and the sound propositions of our own delegates at the conference in March last met with no small measure of praise. The result of this revised scheme means that the path to the Diploma, which forms the seal of a well-instructed gas engineer, is now accessible to many students where hitherto it was beyond their reach. Furthermore, we are entrusted with the power to appoint two of our members to act on the District Gas Education Committee. We shall hereby have an opportunity of passing our educational grievances on to headquarters, and of gaining first-hand knowledge of matters pertaining to that all-important subject.

Since a visit to the Kilmarnock Gas-Works is on our syllabus for this session, I propose to describe the methods adopted there in overcoming various problems which have cropped-up from time to time.

Carbonizing Plant.

The gas-making plant consists of horizontal and intermittent vertical retort settings, and also two water gas installations. Prior to the starting-up of the first water gas plant in 1921, both horizontals and verticals were in operation; the water gas being then manufactured by steaming in the latter setting. When the water gas plant was started, the horizontals were shut-down, and only straight coal gas was manufactured in the verticals, as the intermittent settings cannot with success be steamed continuously. There are still five settings (each of eight through retorts) of horizontals retained; and those are kept, complete with stoking machines, in good working condition.

Heating of Verticals.

The vertical setting, which was erected in 1914, consists of four beds, each having fifteen retorts. Each retort is 16 ft. 6 in. long, and when fully charged contains 13 cwt. of coal. Each bed of verticals has its own gas producer; and for the first two years those producers worked on induced draught. It was found very difficult at times to maintain good uniform heats throughout the settings; and if the heats went back—particularly when the upper regions of the retorts got dull—it often took days of careful handling to regain the lost heat. Each flue of three retorts was fitted with only one burner; the combustion chamber being at the bottom of the retorts, so that if the coke happened to be poor in quality, and the quality or quantity of the producer gas correspondingly poor, the combustion and heat would be spent before the gases had travelled their full distance up to the waste gas outlet.

We therefore, as an experiment, equipped one producer with forced draught in the form of an air injector, operated by steam pressure, and constructed in such a way that, by a simple adjustment, the air-steam mixture entering the producer can be enriched in either air or steam as required. The blast is blown-down a venturi-shaped tube, which is connected to a 9-in. horizontal pipe leading into a large distribution rose fitted under the grate. The original grate was stepped; but in order to suit the new conditions, a flat grate was introduced; the bars being of 2½ in. by 2½ in. angle. These are carried on notched cast-iron bearers.

The advantages of this method of heating were quickly recognized; and soon all the producers were adapted for, and fitted with, forced blast. Control of the bench temperature is now comparatively easy. If the coke is of a good heating quality, but inclined to clinker, the blast can at once be adjusted, in order that more steam be introduced, and the producer made cooler; while, on the other hand, if the coke is dirty and slow to heat, more air and less steam can be supplied, or a greater force of blast can be applied in order to liven-up the fire. Thus, if required, more producer gas can be sent forward, with more force behind it, into the combustion chamber.

Another advantage which might be claimed for this method of heating is that the vacuum within the setting is partially reduced, due to the force of the blast, so that there is a reduction in the volume of cold air drawn-in through any cracks which might occur in the brickwork. Also any leakage of coal gas from defects in retorts will be reduced in volume. It has been found that, when sufficient force of blast is applied in order to reduce the pull in the setting to almost level gauge (3½-tenths is the vacuum at the waste gas flue), the best conditions of working are obtained; and this does not in any way impede the supply of secondary air, which seems to be induced in sufficient quantity by the high temperature of the setting. With the forced draught, the coke consumption in the producers is not unduly high, being 13·5 lbs. per 100 lbs. of coal carbonized.

Water Gas.

When the Corporation decided, in 1921, to instal a water gas plant, the proposition of mixing the coal gas and water gas, without the aid of a relief holder, had to be faced. There is only one gasholder on the present works; while two smaller holders are situated about 1¼ miles distant, on the site of the original Kilmarnock Gas-Works, which were in operation until 1910. Those two gasholders and station governors were retained there, so that, being supplied with gas from the present works, they serve several districts of the town.

The total holder capacity being about 1½ million c.ft., and the maximum daily output in 1921 only verging on 1 million, it seemed an extravagance to erect another holder for water gas. While a 100,000 c.ft. holder would have served the purpose then, in a few years it would have been inadequate; and the adding of new lifts, or building another holder, in the near future did not seem good practice. Consideration was also given to the possibility of using one of the holders on the old works as a relief. This meant the laying of a 15-in. main for water gas through a thickly populated part of the town. In view of the fact that a possible leakage of the odourless water gas might be a source of danger to citizens, this proposition was abandoned.

For the past six years, therefore, the mixing of the coal gas and water gas has been carried on without the aid of a relief holder. The gases are purified separately, and, meeting at a common outlet from the purifiers, they are metered together. Despite the great variations in pressure in the water gas mains,

this method of mixing the gases does not perceptibly affect the works pressure.

There occurred yet another obstacle to be overcome before the success of the venture could be achieved. The water gas, on leaving the washer-scrubber, which forms part of the plant, is heavily charged with water, oil, or tar in the form of a heavy fog. The particles are present in varying magnitudes, from a size visible to the naked eye to an impalpable fog; the latter being so finely divided that it seems to defy the laws of gravity, and refuses to settle, even when stagnant. When a relief holder is used, this suspended matter is very greatly reduced. In Kilmarnock, the water gas, travelling direct from the scrubber, swept this great volume of moisture forward to the purifiers. At times the velocity of the gas would be as high as 14·7 ft. per second; and the quantity of suspended matter varied between 200 and 300 gallons per million c.ft. As a result of this, the functioning of the purifiers became impossible, consequent upon the back-pressure, long before the oxide was fouled. I do not think that the actual drenching with water was altogether the cause of this back-pressure, but that the oxide, being impregnated with oily matter, was rendered impervious to the moisture-laden gas. If a laboratory filter paper, or ordinary blotter, is moistened with oil, water will not pass through; and the circumstances are somewhat similar.

For a time the purification costs soared to abnormal and alarming figures, and efforts were made in the following ways to rectify this steadily increasing expenditure. The oxide was first mixed with coke breeze, and then with moss litter, in order to keep it more open; but this proved of little advantage. The water gas was then led through a set of pipe condensers and also a dried-out Walker scrubber, the capacity of each of the foregoing being 1 million c.ft. per diem, while the water gas plant capacity was only ½ million. A checker-work of loose bricks was also built at the purifier inlet; all these efforts being made with a view to breaking-up the stream of gas by contact, and thereby depositing the moisture. All the above efforts, individually and combined, were in vain, as the moisture, even if deposited from one run of the gas, seemed to be picked-up by the next. It thus came to be realized that some means would require to be devised whereby the moisture would be separated and very quickly deposited from the main, and out of contact with the stream of gas.

While considering the possibility of installing a tar extractor, another appliance actually on the market as a steam dryer was brought to our notice. This was designed to fit into any steam line in order to rid the steam of condensed matter. The makers claimed to be able to provide the solution at a very reasonable price. It was agreed that they should prepare an experimental dryer suitable for fitting into the 15-in. pipe which led up to the purifier inlet. The dryer consisted of a 15-in. diameter cast-iron flanged tube, 20 ft. long. Into this a spiral of sheet steel was fitted longitudinally, so that the gas, on passing through, would be whirled round five times in the short distance of 20 ft. A slotted outlet on the casing, the full length of the dryer, was provided; and this tapered into a 1½-in. pipe, which acted as a conductor for the moisture. The pipe could be extended, and sealed in a tank of water.

The velocity of the gas, forced into this whirling or centrifugal motion through a passage the area of which is so much less than that of the main pipe, is very much increased. In the dryer, it varies from 80 to 100 ft. per second. The centrifugal force thus imparted to the liquid matter in the gas effects a very thorough separation of the two. The water and oily matter, being many hundred times heavier than the gas, is discharged on to the periphery of the dryer; and the slotted opening in the bottom is arranged so that the liquids rush-off tangentially, and are discharged through the 1½-in. outlet into the water trap.

This apparatus was installed five years ago, and from the first day of its active service the purifier trouble ceased—in fact, as far as costs are concerned in purification, we might claim 100 p.ct. efficiency for the dryer. The back-pressure on the water gas plant is only increased by about 2 in. Having no moving parts, the dryer requires no care, further than an occasional blast of steam for a minute or two, in order to remove any thick greasy or tarry matter. Modifications and improvements by the makers have evolved from our experiment a dryer which they claim will remove a greater amount of fog from carburetted water gas than any other known extractor.

Relief Holder.

The Corporation decided, in February last, to erect a 400,000 c.ft. spiral-guided relief holder for water gas; and this will be in operation before the end of the current year. The proportion of water gas added to the coal gas will thus be made uniform throughout the twenty-four hours of the day. The orthodox method of operating with a relief holder is to instal an exhauster in a position between the water gas plant and the water gas purifier. As our present exhauster house is situated at a point beyond the purifiers, it has been arranged that the gas should pass from the holder first to the purifier, and then to the exhauster. It will afterwards pass through a check meter, and meet the stream of coal gas at the station meter inlet.

Steam Boilers.

In 1919, the steam boiler capacity being inadequate, the Corporation agreed that it should be increased. At that time our immediate neighbours, the Corporation Electricity Department, were adding some very high capacity Babcock & Wilcox water-tube boilers, and the Gas Department purchased from them two 30 ft. by 8 ft. Lancashire boilers, in first-class condition. It was decided to equip the boilers with Meldrum mechanical stokers; and, in order to eliminate hand charging, and keep the boiler house floor clear, an elevator and overhead hopper were erected for the lifting and storage of the boiler fuel.

The stoker, which is adapted for charging the fuel on to a fixed grate, is constructed on very simple and substantial lines. The fuel is a mixture of coke breeze and small dross, and is fed by gravity from the overhead hopper into a measuring valve chamber, where the feed is regulated and delivered on to the beater or distributor immediately below. The measuring valve can be regulated from zero to full fuel requirements; while the speed of the beater shaft is about 800 r.p.m., but may be varied to suit the fuel. The stokers on the two boilers operate almost noiselessly, and require only 1 to 2 h.p. to drive them—a horizontal steam engine being used for this purpose.

Even with a fuel containing much dross, it is quite possible to obviate any smoke nuisance; and owing to the fact that the furnace doors very seldom require to be opened, except at cleaning time, a better boiler efficiency is maintained. Previous to this installation, each boilerman, having sundry other duties, had a boy assistant for the removal of ashes, &c. The provision of the stoker and hopper equipment immediately effected an economy, as the three boiler assistants could be dispensed with. Apart from any saving in fuel (which the makers claim to be at least 10 p.ct.), the stokers have proved to be in every respect a very useful investment.

A spare boiler equipment, of similar capacity to the above, was added two years ago. Those boilers were also fitted with Meldrum stokers; but, instead of the fixed grate, an arrangement was introduced whereby the firebars can be shaken, so that, in the event of clinker forming, it will be broken-up in order to admit air. Immediately under the firebar ends, at the boiler front, a shaft carrying a number of cams is fitted; and this can be put into operation, in order to shake the bars, by a clutch connection with the main stoker drive.

Boiler Flues.

Dirty and choked boiler flues are common in gas-works, where coke breeze, being a convenient and cheap fuel, is very generally used. In Kilmarnock, the flue gases, after passing through a Green economizer, have still some distance to travel to the chimney. When breeze was used, the accumulation of dust at certain parts of the flues made flue cleaning about every fortnight, with the boilers steaming, a very costly necessity. A mechanical flue cleaner, which is operated by the boiler's own steam, was therefore introduced.

The flue cleaning operation is merely a churning-up of the dust by a series of steam jets, when the natural chimney draught pulls it along into a specially constructed chamber which acts as a dust trap. A 2-in. solid-drawn wrought-iron tube, connected to a special valve on the boiler head, is led down the boiler front, under the grates, and right through the boiler tubes and flues to the chimney base. At intervals of 5 ft. there are fitted on this tube specially constructed nozzles, which lie on the flue bottoms. By the operation of the valve on the boiler top, the boilerman can send a blast of steam from the nozzles in rotation, starting from the first four situated behind the fire bridge, and so on right through the full length of the flues. Each series of jets is allowed to blow for 15 seconds; and by operating the handwheel of the valve through a definitely fixed arc, the blast of steam is shut-off one lot, and instantly turned on to the next. The complete operation lasts only from 2 to 3 minutes per boiler.

The dust may either be discharged from the chimney top or by-passed into the chamber, where a series of water sprays and baffle walls very effectively trap the solids, while the gases freed from the dust pass on to the chimney. The chamber is flushed with water occasionally, and the dust is washed down a drain. Where this is undesirable, the chamber may be built overhead, and the dust drawn off and carted away.

The success of the flue cleaner depends on the operation being carried out each shift, because, if the dust is allowed to accumulate heavily, it is difficult to shift. The flues are thus cleaned daily, and therefore always kept at their full area; while the steam required is exceedingly little. The plant was put into operation in 1921; and since that time, when the boilers are off for the annual inspection, flue cleaning has been unnecessary. As far as costs and economies are concerned, it can be said with confidence that in this case the end justifies the means.

Tar and Bitumen.

Since 1913 most of the tar produced at Kilmarnock has been dehydrated, and sold for road purposes. The plant for this

was supplied by the Chemical Engineering and Wilton's Patent Furnace Company. Until three years ago a ready sale was always found for the prepared tar and residual oils; and then the demand for tar-bitumen mixtures made the introduction of further plant necessary. The handling of the bitumen was at first rather perplexing for many in the gas industry, as it is neither brittle like pitch nor is it easily made fluid from the cold—being a poor conductor of heat. As it was 1d. per gallon cheaper in rail tanks than in casks, it was decided to buy in tanks. These are well lagged, and fitted with steam coils inside; and, as the bitumen is filled into the tanks at a very high temperature, it usually reaches the gas-works at between 140° to 160° Fahr. With twelve to fifteen hours' steaming, a temperature of over 200° Fahr. is reached; and the tank can best be emptied.

The works railway is within 30 ft. of the mixing plant. The tank is emptied by means of pneumatic pressure applied on the top, while a 3-in. pipe connects the tank bottom with the mixers. It is important to see that all the pipes through which the bitumen flows are well heated immediately before it is turned on. This heating is accomplished by circulating hot tar through them for about ten minutes. When the tank is empty, the pipes are again flushed with hot tar, so that no bitumen can solidify and settle in them. The emptying of a 3000-gallon tank can be accomplished in two to three hours.

The mixers were erected by the Gas Department, and consist of two egg-end boilers, each fitted with a central 3-ft. shaft. At one end the shafts project through stuffing boxes, and are driven by an 8-H.P. electric motor; the shaft speed being geared-down by a worm gear, and further reduced by a countershaft to 15 revolutions per minute. On each shaft are fixed six paddles of flat iron, 24 in. by 8 in. by ¾ in. These are fitted along the shaft to give perfect balance; and when the shaft revolves the paddles do not strike the liquid flat, but at an angle of 30° to the horizontal, so that, as well as imparting a mixing effect, the liquid is washed backwards and forwards within the boiler.

The boilers and mixers have several 3-in. pipes laid along the bottom, in order to supply heat by steam; and the pipe joints inside the boilers are welded, so that no water can get among the tar. One man per shift can operate the plant and fill barrels; the output of dehydrated tar being 20 barrels a shift. The only assistance given is when the bitumen tanks are being emptied, and when barrels are being loaded for despatch.

SULPHATE OF AMMONIA.

With regard to sulphate of ammonia manufacture, there is nothing worthy of comment about the methods employed in Kilmarnock. As it is situated in the centre of an agricultural district, a ready market has always been available for the disposal of the salt.

LOW-TEMPERATURE CARBONIZATION VERSUS TOTAL GASIFICATION.

Untold wealth and energy have, over a period of many years, been expended on investigation processes of low-temperature carbonization. Despite this, no process has yet been devised which has been sufficiently sound commercially to entice the gas industry to do much more than work on an experimental scale. Complete gasification is being carried on in a 25-million works at Goring-on-Thames. The gas supplied to consumers is entirely manufactured in a new total gasification plant, which started operating in February last. The declared calorific value of the gas is 320 B.Th.U.; and this gas is proving satisfactory, both for domestic use and for gas engines. While essentially high in carbon monoxide, it is very low in inerts; and unlike water gas, when purified it has quite a perceptible odour. A description of this plant appeared in the "GAS JOURNAL" of June 29, 1927. Comparing the possible revenue from the gas which this process claims to produce (and the claims are not very extravagant) with that from a similar sized works selling gas, coke, and tar, it would appear to be quite sound commercially.

I feel sure that this method of gas manufacture will gradually gain in popularity—possibly the smaller works being the pioneers. If in this way gasification came to be more generally practised, it would mean a reduction in the manufacture of residual products, and a gradual easing of this market for the larger undertakings. For obvious reasons, it is impossible for big undertakings to revolutionize their methods in less than a period of years; but the fact that total gasification plant can be installed at a low capital cost, and can claim a flexibility in gas manufacture almost equal to that attributed to verticals, makes it a very attractive proposition.

Discussion.

Mr. JAMES HALL, thanking the President, said the problems of others always proved of interest. He appealed to members to take full advantage of the Education Scheme, to which Mr. Fife had referred. Now that the Juniors were represented on the District Committee, members would be able to obtain guidance from delegates. He then intimated that the address was open for discussion.

Mr. D. MELVIN questioned the President on the manufacture of straight coal gas in verticals. He added that the address had whetted his appetite to see the Kilmarnock Gas-Works.

Mr. J. FRAZER (Glasgow) expressed the opinion that low-temperature carbonization had not yet proved successful. He was of opinion that the fuel obtained was hard to beat; but this depended on the coal used. Much required to be done in the way of educating the public in the use of smokeless fuel, and also in the use of the gas for industrial purposes. Gas was being used at Dalmarnock for the heating of retort benches.

The next gathering of the Scottish Western Juniors takes place on Saturday, Oct. 22, when a visit will be paid to the Falkirk Gas-Works.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

VISIT TO CARDIFF.

The First Meeting of the Association for the 1927-28 session was held at Cardiff on Saturday, Oct. 8. The visitors were received at the Company's Grangetown Works by Mr. F. Boardman, Works Manager, on behalf of the Directors and Management of the Cardiff Gas Light and Coke Company. A complete tour of the works was made under the direction of Mr. Boardman, Mr. Blake, and other members of the engineering staff; the three sections of the manufacturing plant and the whole of the subsidiary plant being inspected. Afterwards the members were entertained at tea by the Directors of the Company.

This was followed by a general meeting at the Company's Bute Terrace Offices, presided over by Mr. T. V. BLAKE, the new President, who was supported by Mr. Boardman, Mr. R. J. Auckland (Secretary), Mr. B. J. Bell (Distribution Superintendent), and Mr. J. Mogford.

As a mark of respect and esteem, a vote of condolence was passed to the relatives of the late Mr. C. Dovey, who up to the time of his recent decease was Chairman of the Company.

The following new members were enrolled: Messrs. D. Leyshon (Pontypridd), T. Shute (Cardiff; Associate), and D. Thomas (Cardiff; Associate).

Mr. W. E. Crowley (Newport) was appointed Junior Vice-President in place of Mr. G. H. Hughes, who had left the district to join the staff of the Hastings Gas Company. Mr. Hughes was congratulated upon his success.

Mr. B. J. Bell agreed to undertake the duties of Hon. Treasurer in the place of Mr. A. H. Shepherd (Swansea), who found it necessary to resign the appointment. A vote of thanks was extended to Mr. Shepherd for past services.

The Presidential Certificate was handed to Mr. C. Bateman (Bath), immediate Past-President; and a vote of thanks was passed for the services he had rendered during his year of office.

PRESIDENTIAL ADDRESS

of T. V. BLAKE, of Cardiff.

During my year of office, I intend to cultivate conference by allotting an interval at our meetings to informal questions and answers, with special regard to difficulties and experiences in the many departments of the gas undertakings from which our membership is drawn. I feel confident that, if a simple question is asked, some member will be sufficiently expert in that particular domain to give a lucid reply to the benefit of all present. Incidentally, this will assist in paving the way towards possession of the coveted Diploma of the Institution of Gas Engineers, in which written and verbal expression of knowledge is demanded.

A visit of inspection to the works of a President has not been customary in the past activities; but as the works of the Cardiff Gas Light and Coke Company are considered by many eminent engineers as a fine example of a modern gas-works, I felt that exclusion of its description from our proceedings ought to be remedied.

GRANGETOWN WORKS.

The Grangetown Station of the Cardiff Gas Light and Coke Company comprises three complete sections of gas manufacturing plant; each unit being complete with its auxiliary plant, together with residual plants. The coal is delivered into the works by five sets of high-level gantry railway running the full length of the retort house and coal stores. The wagons are discharged by a number of hydraulic rams situated above the seven coal breakers and elevators. The gas manufacturing sections are as follows:

No. 1 Section.—Vertical retorts, comprising 15 settings of

8 retorts of the Glover-West type, and waste-heat boiler. The carbonizing capacity is 300 tons of Welsh coal per 24 hours. The coke is handled by a system of telpherage, either to the yard or to two sets of storage bunkers. This telpher also supplies coke to the C.W.G. overhead bunkers, and breeze to No. 1 Boiler House. The whole of this section is electrically driven by current supplied from No. 1 Power House adjoining. Five electrical generating units are employed; gas engines supplying the motive power.

No. 2 Section.—Horizontal retorts, comprising 40 regenerative settings, each of 8 retorts 20 ft. long. The carbonizing capacity is 430 tons per 24 hours. The retorts are machines stoked by two Fiddes-Aldridge electric machines. The coke is handled by conveyors (Messrs. West's) and taken direct to overhead storage bunkers of 400 tons capacity. No. 2 Power House supplies electric power and compressed air for the various requirements of this section of the works.

No. 3 Section.—No. 3 Section comprises two Humphreys & Glasgow C.W.G. sets, each capable of producing 2 million c.ft. of gas per diem, complete with waste-heat boiler, each set able to raise 3500 lbs. of steam per hour. This section is also complete with its own exhausting plant, &c. The coke and ashes are handled by travelling cranes. The reserve plant consists of three 1-million per diem sets, which are to be transferred to the new site.

Washing and Scrubbing Plant.—Each of the above sections has its own condensers and washer-scrubbers. No. 1 Yard comprises: Two sets of annular and two large water-cooled condensers; four tower scrubbers; and two rotary washer-scrubbers by Messrs. Kirkham, Hulett, & Chandler. No. 2 Yard comprises: One set of vertical condensers, partly annular and partly water-cooled, and one set of Graham condensers; two Livesey washers; and four rotary brush washers (of the Holmes type).

Dry Purification.—This consists of four sets of purifiers, each of six boxes. Nos. 1 and 2 sets are on the ground floor; the former comprising six boxes, each 38 ft. by 16 ft. 3 in., and the latter six boxes, each 24 ft. by 24 ft. Nos. 3 and 4 sets are elevated boxes, and are filled by hand conveyors. Revivification takes place on a concrete floor underneath the boxes. No. 3 set comprises six boxes, 40 ft. by 24 ft., and No. 4 comprises six boxes 50 ft. by 30 ft. A No. 5 set is in course of construction; and the first two boxes are by Messrs. C. & W. Walker. Size, 40 ft. by 30 ft.

Residual Plants.—Tar dehydration plant by the Chemical Engineering Company. Capacity, 4000 gallons of crude tar per 24 hours. The plant by Messrs. Holmes has a capacity of 5000 gallons per day. Sulphate of ammonia plant by the Chemical Engineering Company, This comprises two sets, one of 4 tons capacity, and one of 6 tons. The plant is equipped with a neutralizing and final drying apparatus. The salt now produced is perfectly dry, contains no free acid, and attains 21·1 p.ct. nitrogen. Concentrated ammonia plant by the Chemical Engineering Company. Capacity, 20,000 gallons per 24 hours. "Notanos" washery by Messrs. Head, Wrightson & Co., Ltd. This is designed for dealing with retort house ashes, and separates the combustible matter therefrom for boiler use. It is fitted with elevated bunkers, and has a capacity of 50 tons per working day of eight hours. This plant is situated at the north gable end of No. 2 Retort House, in a position convenient to receive the ashes from the various furnaces on the works. "Draper" washery by the Rhondda Engineering Company, Ltd. This is designed for breeze washing or for ashes. It is fitted with elevated ferro-concrete bunkers, and has a capacity of 50 tons per working day of eight hours. The "Draper" washer is at present employed on coke grading and screening; the grades offered for sale being broken, nuts, and beans.

Distribution of Gas.—From the holders, the gas is delivered to the trunk mains supplying the district, through a system of governors which control the supply to the various portions of Cardiff and neighbourhood. The governors also control the supply of gas to the Bute Terrace and Taffs Well Stations, where holders are in operation to supply districts immediately adjacent. Two Rateau fans are in use for raising the pressure during periods of exceptional demand, and one Belliss & Morcom compressor is employed for supplying a large outlying area. This compressor is capable of dealing with 300,000 c.ft. of gas per hour at 30 lbs. pressure, and supplies through a 12-in. steel main a distance of five miles, and works in conjunction with a transformer station at Whitchurch.

Laboratory and Test Plant.—A large and well-equipped laboratory and coal testing plant adjoins the governor house.

Workshops.—The works are provided with carpenters', smiths', and engine fitters' shops, equipped with modern machine tools.

Artesian Well.—The works water supply is obtained from an artesian well, 435 ft. deep, 13½ in. bore.

Dining Hall.—The workmen's dining hall, at the north end of the No. 2 Retort House, is capable of accommodating all the men of the station; and the ground floor will, in the near future, be equipped as a central bathroom.

Recreation Ground.—The recreation ground is some 4½ acres, and provides for football, cricket, baseball, tennis, and skittles. The pavilion and dressing rooms give adequate accommodation.

Garage and Locomotive Running Shed.—The above is for the housing of six lorries and two locomotives.

Stores.—There are two stores buildings on the works, one in No. 1 Yard used for general stores, and the other in No. 2 Yard used solely for accommodating stores for the mains and service department.

Yard Equipment.—Three locomotives, three travelling cranes, and four "Sentinel" steam lorries (3-4 tons capacity) for yard work and coke delivery.

War Memorial.—In the arcade entrance at Clive Street Gate. War Memorial erected by the Company in memory of 18 employees of the Company who made the supreme sacrifice during the Great War. Bronze tablet on white marble slab. This Memorial Tablet is identical with one erected at the Bute Terrace Works.

Innovations.

You will have noticed during the visit several innovations, not the least in importance being that the gas from the three generating plants—horizontals, verticals, and C.W.G. unit—is treated in three separate sets of apparatus, with the exception of a slight overlap of the two coal gas streams. This acts as a "safety-first" device in case of breakdown in either section of the coal gas plant; the overload being immediately taken by the plant which has not suffered the calamity.

Though not true to-day, in the past this method of working has enabled one section to be entirely closed-down for cleaning and repairs during the summer season; thereby realizing economy.

Another point worthy of mention is the method adopted for the distribution of gas from the works. While adequate supply is maintained for consumption in the city centre, special measures are undertaken to cater for the immediate wants of the outlying districts, at the same time providing a good reserve for future demand. In this respect attention may be drawn to the supply of Taffs Well (where the local gasholders receive a supply direct from the Grangetown Station, for distribution), Whitchurch, and Llanishen districts, which have recently greatly extended the Company's area of supply.

A further item I would like to commend to your notice is that of electricity generation for works requirements, where its use for power and lighting is necessary. Gas and steam engines supply the motive power; town gas, and steam raised from waste heat and low-grade fuel, being employed. A gas works is ideal for the generation of electricity. The costs sheet emphatically proves the economy of the practice, which is worthy of the closest scrutiny by electrical advocates who use raw coal for this purpose.

I was interested in that portion of the paper entitled "Present Day Problems" submitted by Mr. T. A. Canning, of Woking, at the meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers on Sept. 22—see "Journal" for Oct. 5, p. 49—dealing with 12-hour carbonizing periods in plant specially suitable for 8-hour work. As the two systems have recently been working in parallel at the works with which I am connected, my experience may be of general interest. It must be clearly understood, however, that the number and size of retorts, change in the character of the coals during carbonization, and type of mechanical charger employed affect the results.

My experience leads me to conclude that 12-hour work in 8-hour settings would not give a better all-round efficiency than the 8-hour system, for the following reasons:

(1) The cwt.-hour cycle common to 8-hour settings could not be practised in 12-hour work, owing to the method of charging, size of retorts, and behaviour of the charge during carbonization.
(2) The make per ton is correspondingly less.
(3) The calorific value is lower and variable.
(4) The depth of fuel bed in the producer is of necessity more variable.
(5) Difficulty in obtaining proportionate work during the whole 24 hours using 8-hour periods for labour.

Of course, any attempt to increase the charge in 8-hour retorts working 12 hours would constitute "long period heavy charging" of the retorts, with the results available from data obtained in recent years.

C.W.G. Plant.

With regard to the self-clinkering grate of automatic C.W.G. plants, the high air-blast pressures, while being desirable for output per generator, militate against the process of self-clinkering by the formation of large clinkers. A large volume of air at lower pressure, combined with larger grate area, would produce less clinker.

Mixing of Gases.

Where it is common practice to mix the coal gas streams with carburetted water gas, it is always debatable at which point the mixing should take place to obtain a perfect mixture of the two gases of relatively high and low densities. The various points of admixture may be summarized as follows:

(1) At the inlet of the coal gas condensers, through control valves.

(2) At the coal gas exhausters, through control valves.
(3) In the storage holders.
(4) In the mains leading to the storage holders; the latter feeding a secondary holder before the mixed gas is distributed.

The first method has the advantage that the carburetted water gas meets the coal gas while hot, and the mixture is dealt with by one set of exhausters, where an intimate mixture should be obtained. Moreover, the gas passing to the purifiers will be alkaline. It has three distinct disadvantages which are of great importance. First, by imposing more work upon already fully loaded apparatus (this is especially the case during hot weather); secondly, examination of the gas streams would be an impossibility; and thirdly, the true function of vacuum control in the retort house is affected.

The second method suffers from the disadvantage of (1), but in less degree.

The third method, while possessing the advantages of gas stream testing, has the disadvantage of requiring separate exhausters and purification plant. Also, there is a risk of incomplete diffusion when the gases are passed into a holder which is supplying the district.

The fourth method holds out the most advantages in the matter of positive control of plants, the examination of individual gas streams, and the smallest risk of unmixed gas reaching the district.

Wet Purification Plant.

A secondary thought always comes to our mind when mention is made of this portion of gas-works apparatus—that is, the recovery of ammonia, for the manufacture of sulphate. The future holds little hope of increased revenue from this source, the chief reasons being the greatly increased and cheap production of synthetic ammonia, and the continued high prices quoted for sulphuric acid. Meanwhile, gas undertakings are compelled to extract this impurity from town gas; and consequently some ammonium compound must be manufactured, or a modified liquor run to waste.

Two alternatives present themselves:

(1) To work-up weak ammoniacal liquor by recirculation, so that only strong liquor is dealt with in the sulphate plant, thereby reducing working costs.
(2) The distillation of liquor by waste heat in specially designed apparatus, whereby maximum quantities of sulphuretted hydrogen and carbon dioxide, practically free from ammonia, would be formed. This mixture would be passed through sulphuric acid, with the formation of a small quantity of sulphate of ammonia; and then the sulphuretted hydrogen burnt in a suitable furnace for the final production of sulphuric acid. The resultant gaseous or aqueous ammonia could be used direct for the manufacture of sulphate.

It is conceivable that such a method could be made practicable only on a works producing adequate quantities of liquor. In spite of the fact that the washing plant is of primary importance in gas purification, the present methods appear unscientific, since the gaseous impurities (ammonia, sulphuretted hydrogen, and carbon dioxide) of the crude gas are removed by the washing plant, only to be liberated again at the outlet of the sulphate stills. Direct or semi-direct methods of ammonia recovery may prove more economical.

Dry Purification Plant.

Dry purification by iron oxide and kindred "special materials" can be carried out satisfactorily, and at a low cost, if particular attention is paid, not so much to the oxide of iron content, but to the general distribution of this compound over the fibrous peat, which is intermixed in the natural bog ores. This ensures a purifying material comprised of multitudinous surfaces of oxide, offering the minimum resistance to the flow of gas.

Acid and tar fog in the purifying materials are detrimental to good working. Nuisances from these causes are more usually found in the C.W.G. purifiers. Spraying with liquor instead of water during revivification obviates the acid, and efficient condensation and tar extraction prevent the clogging. Careful control of working temperatures is important. Revivification *in situ* by careful admixture of air, preferably by meter measurement, with the unpurified gas, aids economy.

In my opinion, the day is not far distant when dry purification will be conducted as a wet process in some type of washing machine, using iron or other cheap compounds lixiviated with water in a colloidal state. The process must, of course, be 100 p.ct. efficient.

Moisture in Town Gas.

The employment of a cold concentrated solution of calcium chloride in a washer offers a cheap and effective means of partially drying the gas. The treated gas is capable of absorbing more water vapour, the quantity of which varies according to temperature. Hence, if the gas is to be stored after drying, this re-absorption must be prevented by having a film of oil on the water in the holder tank. In the initial application of the process, the gas is sufficiently dried to enable the condensate already deposited in the distribution system to be absorbed, and to leave the mains dry.

It has been proved that the deposition of naphthalene in the gas is greatest at its dew-point. Thus a dried gas is less liable to deposit naphthalene.

Waterless Holders.

The advantages claimed for the waterless holder are:

(1) No water tank required.
(2) Small and inexpensive foundations.
(3) Minimum cost of maintenance and repairs.
(4) Practically constant pressure, irrespective of position of piston.
(5) No interference of working during winter, due to freezing, and alteration in pressures due to snow.
(6) Easy access to all parts for inspection.
(7) Increase in capacity possible while holder is still working.

With the tankless holder, dry gas could be stored without absorbing moisture.

Education.

The Education Scheme, as originally designed, did not invite the greatest number of candidates. Now, however, District Committees have been set up consisting of representatives of the Senior and Junior Gas Associations, and also the Education Authorities. The representatives of this Association are Messrs. T. V. Blake, B. J. Bell, C. B. Felton, and A. E. Martin; and intending students are requested to inform any of these gentlemen of any difficulties they may experience, with special regard to the attendance at classes in Gas Engineering, Gas Supply, and cognate subjects. The following facilities have been provided:

(1) Courses of instruction have been arranged at the Cardiff Technical College, and practical demonstrations at, and visits to, the gas-works have been arranged by the Cardiff Gas Light and Coke Company.
(2) Possession of examination certificates issued by the Institution of Gas Engineers and the Cardiff Technical College will be recognized in cases of promotion by the Administrators of gas undertakings. Also, as is already known to us, the Senior Association recognizes the results of these examinations by presenting prizes.
(3) The Principal of the Cardiff Technical College is prepared to arrange classes in Gas Engineering and Gas Supply, together with the cognate subjects, to be held on one day in the week, provided a sufficient number of students will attend.

It is hoped that the gas undertakings will grant their juniors time and travelling facilities for attendance at these classes. Courses can also be arranged elsewhere if required. Greater facilities are also offered to those who aspire to the possession of the Diploma, though qualified externally, through the general scheme of education. It will be observed that much has been done by the Education Committees to encourage and help the students, for the ultimate benefit of themselves and the industry generally.

Mr. B. J. Bell proposed, and Mr. C. S. Thane (Newport) seconded, that a vote of thanks be accorded Mr. Blake. This was enthusiastically carried. The vote was supported; and eulogistic references to the nomination of Mr. Blake were made by Messrs. R. J. Auckland, F. Boardman, J. Mogford, W. E. Crowley, R. J. Williams, K. Jones, C. G. Brown, W. H. T. Johns, and T. Smith.

Mr. J. Mogford, speaking in support of the Education Scheme of the Institution of Gas Engineers, detailed the facilities which are afforded, and appealed to students and prospective students to take full advantage thereof.

On the proposition of Mr. A. E. Martin (Merthyr Tydfil), seconded by Mr. W. E. Crowley, thanks were accorded the Directors and management of the Cardiff Gas Light and Coke Company for their hospitality.

Thomas Hawksley Lecture.—The Thomas Hawksley Lecture will be delivered at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, on Friday, Nov. 4, at 6 p.m., by Sir William H. Bragg, K.B.E., F.R.S., who will take for his subject "The Application of X-Rays to the Study of the Crystalline Structure of Materials."

British Industries Fair.—It should have been mentioned in the article appearing on p. 114 of last week's "Journal" that the Institution of Gas Engineers (as well as the National Gas Council and the British Commercial Gas Association) have decided to extend their patronage to the Gas Industries Section of the forthcoming British Industries Fair at Castle Bromwich.

REGISTER OF PATENTS.

Waterless Gasholders.—No. 276,935.

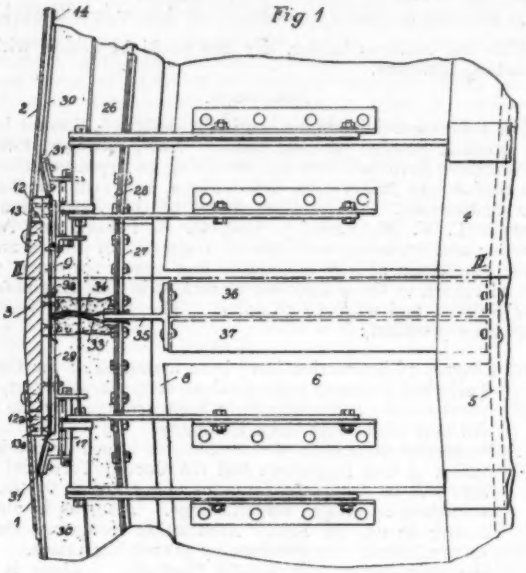
MARKS, E. C. R., of Lincoln's Inn Fields, W.C. 2 (a communication from the Maschinenfabrik Augsburg-Nurnberg, A.G.).

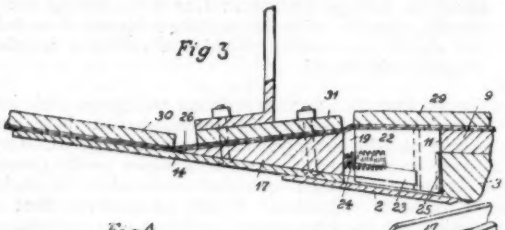
No. 14,421; May 28, 1927.

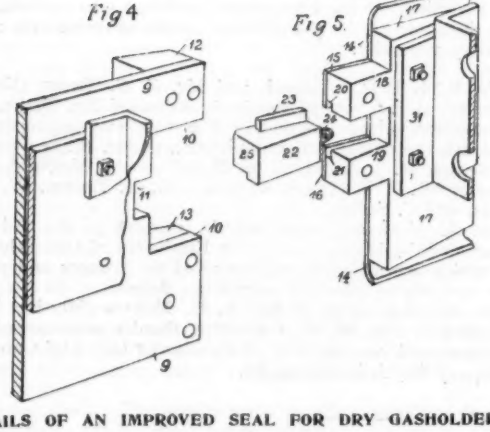
This invention relates to the seal of waterless gasholders, regarding which the patentee points out that where the sealing fluid is relatively thick or viscous, no trouble arises, but where the fluid is relatively thin—as, for instance, tar produced in the manufacture of water gas—it becomes necessary that a close union between the movable piston and wall elements be effected to prevent a too free passage of the tar.

This result is obtained, according to the invention, by the rubbing shoes and plates of which the wall of the trough for the sealing liquid is composed engaging with one another by means of teeth or recesses and projections. Furthermore, the shoes rubbing against the corner posts of the wall and forming a part of the sealing trough are equipped with blocks pressed resiliently against the edges of the posts and slidable in guides, which form a sort of labyrinth packing for the sealing liquid.

Other features are made clear in the specification, from which we extract the following passages and drawings.







DETAILS OF AN IMPROVED SEAL FOR DRY GASHOLDERS.

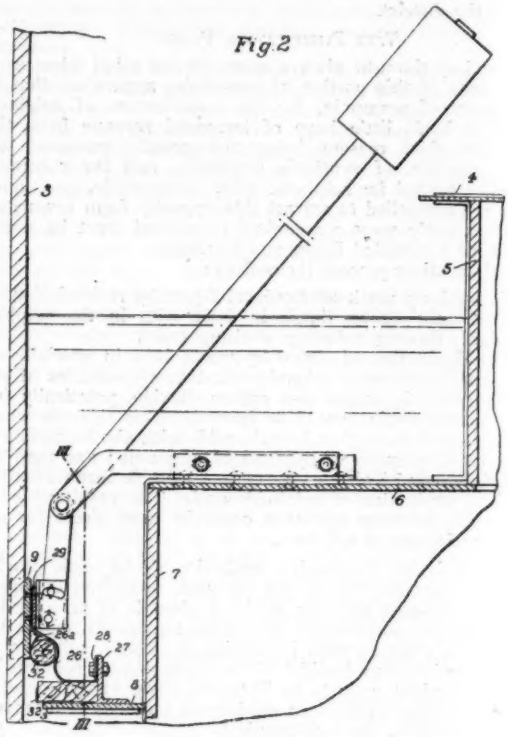
Fig. 1 is a top plan view of part of a holder; parts being shown in section. Fig. 2 is a vertical sectional view taken on the line II—II of fig. 1. Fig. 3 is a sectional plan view of the adjacent ends of shoes. Fig. 4 is a perspective view, partly broken away, of one of the elements of rubbing bars; and fig. 5 n similar view of the elements which co-operate with same.

In the drawings, a portion of the shell is shown (see figs. 1 and 2) comprising vertical plates 1 and 2 riveted at their edges to a relatively heavy column member 3. The disc 4 has a depending wall 5, a shelf 6, a second depending wall 7, and a bracket element 8.

Supported by the disc and urged outwardly against the inner wall of the holder is a series of inter-engaging rubbing shoes or plates; and co-operating with the plates is a flexible member which in effect forms the bottom of the trough.

Bearing against each of the columns 3 is a rubbing bar or shoe 9. Each end thereof (see fig. 4) is cut away at 10, a second and narrower notch 11 extending inwardly from the base of the larger recess. The shoe at each end has secured to it a pair of blocks—12 and 13, and 12a and 13a. The blocks are so spaced that they stand close to, but not quite in contact with, the edges of the column 3, so that the shoe may move vertically in relation to the column without binding.

Between the shoes 9 there are rubbing plates 14, which bear against the inside of the wall. Each end of these plates is provided with projections 15 and 16; and in addition they carry a filler block 17, wedge-shaped in cross-section and provided with two elements 18 and 19 of the same dimensions as the members 15 and 16, to which they are riveted. The over-all distance between the outer faces of 18 and 19 is such that they make relatively close contact with the side walls of opening 10. Within the space formed between the



inner faces of 18 and 19 is a sliding block 22, provided with lateral wings or ribs 23, which take into grooves 20 and 21. A spring 24 is seated at one end in a recess formed in the sliding block, the opposite end taking against the adjacent face of the member 17. When the parts are assembled, the spring tends to force the block 22 outwardly into the recess 11 in the rubbing bar of the shoe 9. As will best be seen upon reference to figs. 3 and 4, the block is of such thickness that it is substantially equal to that of the shoe or plate 9 and the blocks 12 and 13. In other words, the forward end, designated by 25, of the block 22 projects outwardly and into contact with the vertical edges of the column 3. The spring tends at all times to hold the face 25 directly in contact with the edge of the column and thus induces a relatively tight joint between the parts under all working conditions.

A flexible member 26 is formed of canvas or equivalent material. The inner edge of this is clamped between an upstanding angle 27 secured to the member 8 and a plate 28 attached by bolts or the like to 27. The canvas is doubled upon itself; and the folded portion bears against the rubbing shoes and also the filler blocks, and is clamped by suitable plates 29, 30, and 31 (see more particularly fig. 3). Care is taken that relative movement of the rubbing pieces and the like is still possible, so that they can adapt themselves to irregularities in the form of the holder.

As will be seen upon reference to fig. 2, the canvas is carried down and round bars 32, preferably of wood, and the edge 26a is stitched to the body. These bars act as spacers, and serve to hold the canvas out of contact with the wall of the holder and thus prevent wearing of the canvas against the wall as the piston is moved up and down. Suitable wooden elements, 32a (see fig. 2) form a rest for the lower portion of the canvas, and hold such portion out of contact with metal which would have a tendency to chafe it.

To prevent the sealing medium from running to one side, should the closure assume a position other than horizontal, the channel is divided in a series of pockets. This is accomplished by securing the lower ends of vertically disposed strips 33 and 34 of canvas (see

fig. 1) to the canvas element 26, and securing the edges thereof to upward extensions 9a of shoes 9, and to a vertical element 35 secured to frame elements 36 and 37 secured to the disc.

The various rubbing shoes or bars are held in close contact at all times with plates 1 and 2 and columns 3 by a series of weighted levers.

Cleaning of Carbonaceous Materials.—No. 276,723.

LESSING, R., of High Holborn, W.C. 1.

No. 13,402; May 27, 1926.

This invention is specially applicable to the separation of coal into low-ash and high-ash portions. In a preferred form of the process, the coal is continuously passed into a bath containing a solution of calcium chloride of specific gravity sufficient to float the "low ash" component and cause the "high ash" component to sink. If desired, a plurality of such fractional flotations may be employed in sequence. In some cases it is of advantage to agitate the bath locally at the point of introduction of the coal, in order to separate the particles from each other.

The float, which comprises essentially the clean coal, is removed from the top of the vessel; and the sink, which comprises the mineral matter, is carried out by an elevator, each into drainers. For economy it is necessary to recover the dissolved salt, and with the least possible dilution, so as to avoid unnecessary expense in concentration. The float (and if desired the sink) is therefore drained and washed by downward displacement of the liquor with a continuous body of water.

The float, consisting of a paste of clean coal with adherent calcium chloride solution, and the sink, consisting of a paste of mineral matter with solution, are separately charged into suitable vessels from the bottom of which some of the excess solution may be drained away; but care should be taken not to allow the level of the solution to fall below the upper level of the solid. Water is carefully superimposed upon the level of the calcium chloride, and is allowed slowly to descend as an unbroken body in contact with the coal to be washed. It is found in practice that there is a relatively sharp line of demarcation between the washing water and the concentrated solution which is downwardly displaced thereby; and accordingly this concentrated solution can be drawn off at the bottom with little or no dilution, and reconcentrated by heat to enable it to be returned to the cycle of operations. There should be no broken films or boundaries between the washing water and the concentrated solution displaced thereby. In this way the adherent solution is effectively removed, even from the under side of the individual pieces of coal, with the last possible dilution. If desired, weak liquor or, successively, liquors of descending strength may first be superimposed upon the strong liquor, and finally water on the weak liquor; strong liquor, weak liquor, and water being drawn off separately from the bottom of the draining vessels.

The patentee points out that there is considerable advantage in removing as much as practicable of the dust which, for example, passes through a 50-mesh I.M.M. screen. It is particularly desirable that not more than 2 p.ct., and preferably less than 1 p.ct., of such dust is present. [A co-pending application relates to a process for ensuring this condition.]

These data as to fineness and proportions are, it is stated, indicative, but the material passing a 50-mesh I.M.M. screen consists mainly of fusain and finely divided clay and other materials. Some of these materials are highly porous, and others usually colloidal; and they considerably impede the flow of liquids between the particles. When treating bituminous coal, it is possible in this way to separate the coking from the non-coking or feebly coking portion.

Drainage may be assisted by pressure or suction; and it may be advisable to vibrate the drainer by tapping or hammering the vessel or by plunger action applied to the contents. However, excessive vibration should be avoided, since this might cause diffusion of water or weak solution into the strong solution.

Diagrams and a detailed explanation are given of a form of apparatus for carrying out the invention. It is claimed that other substances than calcium chloride may be employed.

Treatment of Gases by Solid Reagents.—No. 276,736.

HENSHAW, D. M., WATSON, S. G., and W. C. HOLMES & CO., LTD., all of Huddersfield.

No. 20,472; June 12, 1926.

This invention relates to the carrying-out of reactions in gases by the employment of solid catalytic or other reactive agents. As an example, the purification of gas involving the removal therefrom of sulphuretted hydrogen and the recovery of sulphur by passing the gas through iron oxide or other suitable contact material in a heated condition may be mentioned. In the purification of gas in this way the most suitable contact materials lose their catalytic activity and under the most favourable conditions gradually fall away.

The object of the present invention is to provide an improved apparatus in which the catalytic material is arranged to be maintained in an active state by the continuous or periodic removal of the spent and the introduction of fresh material.

Apparatus according to the invention is characterized in that, within a chamber provided with an inlet and an outlet for the gas, a trunk or inner chamber having foraminous walls adapted to enclose the solid contact material is located, and baffles, extending from the walls of the first-mentioned chamber to the walls of the inner chamber, are provided to cause the gases to travel repeatedly and in a zig-zag path through the body of solid material within the inner chamber.

A form of apparatus is described with reference to a diagram.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 5.]

Nos. 25,283—25,994.

BRADSHAW, K. W.—"Gas compressors." No. 25,875.
BUTTERWORTH, E.—"Gas meters." No. 25,783.
COTTELL, G. A.—See Bradshaw, K. W. No. 25,875.
CUTLER, S.—"Level-indicators for gasholders." No. 25,969.
HIRCHBERG, L. M.—"Treatment of coal." No. 25,456.
HIRCHBERG, L. M.—"Distillation of coal." No. 25,710.
HUMPHREYS & GLASGOW, LTD.—"Manufacture of mixed gas." Nos. 25,513, 25,514.
LAING, B.—"Gasholders." No. 25,424.
MCCLEARY, J.—See Laing, B. No. 25,424.
MASTERS, E.—"Vertical gas retorts." No. 25,843.
MASTERS, J. E.—See Masters, E. No. 25,843.
MULLEN, M. A.—"Valves for gas stoves." No. 25,598.
NAYLOR, S.—"Valves for controlling gas supply to gas-heated boilers." No. 25,926.
NIELSEN, H.—See Laing, B. No. 25,424.
ROTARY METER COMPANY, LTD.—See Butterworth, E. No. 25,783.
THORP, F.—See Butterworth, E. No. 25,783.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Otto Coke Ovens.

SIR,—The attention of the Directors of Successors to the Otto Coke Oven Company, Ltd., has been drawn to a paragraph on p. 69 of your issue of the 5th inst., under the heading "Otto Coke Ovens at Derwenthaugh."

They desire me to bring to your notice, and to that of your readers, the following facts, which speak for themselves, requesting you to be good enough to insert this letter in your next issue, and to give to it the prominence which was given to the paragraph in question.

1.—The German Otto Company, Dr. C. Otto & Co. Gesellschaft mit Beschrankter Haftung, obtained, about the year 1897, an order in Middlesbrough for coke ovens.

2.—In the year 1900 a company was formed in England, called the Otto-Hilgenstock Bye-Product and Non-Bye-Product Coke Ovens and Coal Washing Company, Ltd., which name was afterwards shortened—first, to "The Otto-Hilgenstock Coke Oven Company, Ltd.," and afterwards to "The Otto Coke Oven Company, Ltd."

3.—This Company was granted by the German Company the right to use the latter's English patents, and operated in this country for some time under the management of Dr. Hiby, who is believed to have been a German subject, and Mr. Grahame Christie, a son of Mr. J. A. Christie, formerly well known in British banking circles.

4.—At or about the time of the outbreak of war, Dr. Hiby left this country.

5.—In the month of October, 1917, the Otto Coke Oven Company, Ltd., registered a special resolution to the effect that the following gentlemen should be removed from the office of Director—namely, Dr. Walter Hiby, Mr. Heinrich Schuster, Mr. Heinrich Meyer, and Dr. Carl Otto.

6.—In the course of the war, the Board of Trade vested those shares in the Otto Coke Oven Company, Ltd., which were held by enemies or enemy subjects in the Custodian under the Trading with the Enemy Acts, with a view to such shares being sold to British subjects, instead of making an order under section 1 of the Trading with the Enemy Amendment Act, 1916.

7.—By deed dated July 2, 1917, the Otto Coke Oven Company, Ltd., assigned to Successors to the Otto Coke Oven Company, Ltd., *inter alia*, the goodwill of the business of coke oven construction with or without bye-product recovery installations hitherto carried on by the Otto Coke Oven Company, Ltd. (therein called the old Company), together with all trade marks, if any, and together with the exclusive right on the part of the Successors Company to hold themselves out as carrying on business in succession to the old Company, and also the right (and so far as the old Company could confer the same, the exclusive right) to use the name "Otto" in connection with coke oven construction with or without bye-product recovery installations. The transfer included the patent rights of the old Company.

8.—The Successors Company has from the time of the purchase never ceased in its activities, and has built several hundred Otto ovens.

SUCCESSORS TO THE OTTO COKE OVEN COMPANY, LTD.,
H. W. SWINDELLS,
Secretary.

7, *Museum Street*,
Manchester.
Oct. 15, 1927.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

Mablethorpe and Sutton Gas Company, Ltd.

To authorize the Company to use scheduled land for gas purposes, to charge for gas on the calorific basis, to increase the borrowing powers, to establish profit sharing, and for other purposes.

SPECIAL ORDER.

Annfield Plain and District Gas Company.

To extend the limits of supply to include so much of the urban district of Tanfield as was not included under the Company's Act of 1907; to empower the Company to purchase by agreement certain mains, &c., of the Lambton Hetton and Joicey Collieries, Ltd.; to enable them to raise further money; and for other purposes.

INSTITUTION OF GAS ENGINEERS' EDUCATION SCHEME.

Further List of Successes in 1927 Examinations.

The Organizing Secretary (Mr. Walter Hole) has forwarded a further list of successes obtained in the examinations in Gas Supply this year. (Previous lists were published in the "JOURNAL" for July 6, Aug. 24, and Sept. 21.)

BIRMINGHAM CENTRAL TECHNICAL COLLEGE.

Gas Supply—Ordinary Grade.

Name.	Class.	Ancillary Subjects Taken.
Grant, Frederick Austin	2nd	Maths., Chemistry, Physics, Applied Mechanics, and Heat Engines.
Mackenzie, Robert	2nd	Maths., Chemistry, Physics, Applied Mechanics, and Heat Engines.
Oddy, Geoffrey James	2nd	Maths., Chemistry, Physics, Applied Mechanics, and Heat Engines.

HUDDERSFIELD TECHNICAL COLLEGE.

Gas Supply—Ordinary Grade.

Longbottom, Eric	2nd	Chemistry, Physics, Building Construction.

GAS INDUSTRY IN CANADA.

In his report (as published by the Government Department of Trade and Commerce, at Ottawa) for the year ended March 31, Mr. J. L. Stiver, Director of Electricity and Gas Inspection Services, makes the following observations regarding the gas industry of Canada:

The manufactured gas industry is steadily growing. According to returns sent to the Department, there were approximately 15,227,161,000 c.ft. of gas sold in Canada last year, as compared with 14,427,246,000 c.ft. sold the year previous, or an increase of approximately 801,000,000 c.ft. There was also an increase of 19,429 in the number of gas meters in use on manufactured gas, making a total of 462,496.

The number of calorific tests made on the manufactured gas was 3527, of which 33 showed the heating value to be below the standard permitted by regulation, which is 450 B.Th.U. per c.ft. The average value for all the tests was 491 B.Th.U., which indicates that in most cases the gas was kept well above standard requirements.

The natural gas industry has also extended during the past year. The number of meters increased from 85,752 to 90,302, and the gas sold from 13,000,000,000 to 17,863,365,700 c.ft.

Acetylene gas for household purposes is apparently gradually disappearing. The number of meters decreased from 425 to 358. This gas is used in Manitoba. The quantity of acetylene gas made was 1,247,108 c.ft.

TRIPLE FATALITY AT HOLLAND PARK.

In last week's "JOURNAL" mention was made of the triple tragedy which occurred in Holland Park, on Friday, Oct. 7, when two workmen and a Metropolitan policeman lost their lives in a shaft leading to an underground electrical inspection chamber. Two of the victims met their death by going to the rescue of the third. The inquest was held at Hammersmith on Oct. 11. Dr. Illingworth, Medical Superintendent of the West London Hospital, said that Cook (the policeman) died from asphyxia caused by the inhalation of gas. He (witness) had to diagnose from the negative side, but he thought the gas was probably carbon dioxide, with a probability of a very small proportion of carbon monoxide mixed with it. When a person inhaled very dense carbon dioxide, death came very suddenly. The Coroner asked what would cause these gases to generate; and Dr. Illingworth replied that the lime might be responsible.

Dr. Broughton, Police Divisional Surgeon, said he made a post-mortem examination of Ball and Williams (the two workmen). He thought death was caused by carbon dioxide, with carbon monoxide as a strong contributory factor. Carbon dioxide was a heavy gas which was found at the bottom of wells, and apparently in this case the first man fell into the water, and stirred up the gas. There was no evidence of drowning in the case. Ball was probably dead when he fell into the water.

Mr. Sydney Morse, who represented the Notting Hill Electric Light Company, said the shaft had been closed again, but it was intended later to conduct experiments with the object of discovering how the gases were generated.

The jury returned a verdict of accidental death.

SOUTH AUSTRALIAN GAS COMPANY.

A Satisfactory Year.

The Annual Meeting of the Company was held in Adelaide on Aug. 25—Mr. ARTHUR WATERHOUSE, Chairman of Directors, presiding.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said that the profit for the year was £112,438. Out of this, £80,372 was required to meet the dividend of 8 p.ct. for the year; and the balance—viz., £32,066—had been transferred to the credit of the special purposes fund inaugurated under the Gas Act, 1924, which fund had not yet in any year been credited with the full amount authorized under the Act. Though the present credit to this fund was £54,179, it was felt, with the calls that must be made on it from time to time, and the proposed extensive removals of plant from Brompton to Osborne, that it was essential for this reserve to be built up as soon as possible to the maximum provided under the Act.

The demand for gas and bye-products, and the consequent revenue, continued to increase steadily. Last year the gas output was 1453 million c.ft., compared with 1340 millions during the previous year. Excellent results continued from the activities of the showroom staff, whose efforts had again secured large sales of appliances. Activity in the Industrial Department had been maintained, with highly satisfactory results.

Sir FRANK MOULDEN seconded the adoption of the report, which was carried unanimously.

COAL PROFITS AND OTHER STATISTICS.

Information as to the costs of production, proceeds, and profits of the coal-mining industry in the first quarter of 1927 has been issued by the Mines Department. It shows an improvement in the financial position as compared with the corresponding period of the immediately preceding years. One district (South Wales) returned an actual loss on working; but taking all areas together the net surplus realized was £3,497,463—representing 1s. 2·41d. per ton of coal sold. This compares with a surplus of £1,453,207, or 6d. per ton, in the first quarter of 1925, when the industry, as in the period under review, was not in receipt of a subsidy. It should, however, be noted that these results were achieved just after the conclusion of the prolonged stoppage, when all classes of coal were in demand. It has already been announced that the figures for subsequent periods are much less favourable. Of the total production of 63,329,641 tons, 58,222,345 tons were available for export or home consumption, and on the basis of this last figure the aggregate net costs and the proceeds of sales were:

—	Total.	Per Ton
	£	s. d.
Proceeds of sales	50,539,967	17 4·33
Net costs	47,042,504	16 1·92
Surplus	3,497,463	1 2·41

A deficit of £216,766, or over 4¾d. per ton, was returned by South Wales; all other areas showed surpluses ranging from 2¾d. per ton in Scotland to 5s. 1¼d. in Derby, Leicester, and Warwick. The total number of workers employed was 969,943, and during the quarter 61,307,671 man-shifts were worked above and below ground. The average output and earnings per man-shift were 20·66 cwt. and 10s. 7·12d. respectively.

Regarding the above, Mr. Philip Gee, Director of the Colliery Owners' Publicity Department, writes:

The publication of the statistical summary by the Mines Department for the first quarter of 1927 should do something to correct the wild statements that have been made as to the losses of the industry and the earnings of the miners since the resumption of work. It is quite true that the period was still abnormal, and that the same results cannot be expected from the second quarter of the year. But a comparison with the first quarter of 1926—when the subsidy was still being paid—yields the following very remarkable results:

Per Ton Commercially Disposable.	March Quarter. 1926.	1927.
	s. d.	s. d.
Net cost of production	17 2·05	16 1·92
Wages cost	12 3·88	11 1·85
Average earnings per shift	10 4·79	10 7·12
Credit or debit balance, omitting subsidy	Dr. 1 4·63	Cr. 1 2·41
" " " aggregate	Dr. £4,186,848	Cr. £3,497,463

Surely those figures are an answer to the reckless and persistent charges of the complete failure of the colliery owners' policy. Admitting the abnormality of the period, and that the proceeds of commercial disposals rose from 15s. 0·42d. per ton to 17s. 4·33d., it still remains a fact that costs were reduced, that earnings per shift actually increased, and that a loss of nearly £4,250,000 was turned into a credit of nearly £3,500,000.

THIRD CENSUS OF PRODUCTION (1924).

GAS UNDERTAKINGS.

There was published in the "Board of Trade Journal" for Oct. 6 a supplement (Preliminary Report No. 24 of the Census of Production, 1924) reviewing public utility services which are wholly or in part operated by local authorities. Under section 7 of the Census of Production Act, 1906, local authorities were included within the scope of the census when, in the exercise of their powers, they carried on a trade or business of the descriptions specified in the Schedule to the Act. For the third census, local authorities were required to furnish separate returns in respect of gas, electricity, and water undertakings operated by them. Separate returns were also obtained from companies. The information obtained is believed to be reasonably complete in the case of gas, water, and electricity produced for sale. We reproduce from the "Board of Trade Journal" the section relating to gas undertakings.

In the following statement particulars are given of the production in the years 1924 and 1907 of gas undertakings conducted by companies and by local authorities in Great Britain. Comparative figures for companies and local authorities are given in a table at the end of this section; but the tables immediately following relate to the total operation of companies and local authorities together.

Products.	1924.		1907.	
	Quantity.	Selling Value.	Quantity.	Selling Value.
		£		£
Coal gas and water gas.	..	46,164,000	..	22,441,000
	Tons.		Tons.	
Coke and breeze. . .	7,852,000	11,156,000	7,412,000	4,275,000
	Butts.			
Ammoniacal liquors .	1,220,000	135,000	..	307,000
Ammoniacal liquor and crude tar, not separately distinguished .	..	..	..	184,000
	Galls.		Tons.	
Tar.	22,233,000	442,000	635,000	646,000
	Tons.			
	657,000	1,985,000		
	Tons.		Tons.	
Bye-products—				
Sulphate of ammonia	127,000	1,320,000	104,000	1,060,000
	Galls.		Galls.	
Benzole and toluole .	1,953,000	120,000	46,000	2,000
Naphtha	570,000	25,000	347,000	9,000
	Tons.		Tons.	
Pitch	114,000	324,000	85,000	111,000
	Galls.		Galls.	
Tar oil, creosote oil, and other heavy coal tar oils	21,314,000	617,000	7,856,000	84,000
Other distillation products	..	194,000	..	213,000
Total value bye-products	..	2,600,000	..	1,479,000
Other products		510,000	..	25,000
Fitting up and repairing meters, stoves, and other appliances for consumers		1,232,000*	..	1,288,000*
Total value of goods made and fitting and repairing work done for consumers		64,224,000	..	30,645,000

* Amount received for work done.

The amounts shown above relate to products made for sale only. Thus the figures given for ammoniacal liquor and tar do not represent the total quantities made, but only those quantities which were not subjected to further treatment in the works in which they were made. Similarly, gas and coke used in the works in which they were made were not included as part of the output of those works. The figures given in respect of "Fitting-up and Repairing Meters, Stoves, &c.," represent only the amounts charged for fitting-up and repairing, and do not include the cost of the meters, stoves, and other appliances.

As particulars of the quantities of gas made in 1924 were not obtainable compulsorily, all proprietors of gas undertakings were requested to furnish this information voluntarily in terms of both cubic feet and therms. The response to this request was almost complete; the information received being as follows:

Gas Made in 1924.	1000 C.Ft.	1000 Therms.
Coal gas	176,280,000	890,230
	57,308,000	(not recorded)
Producer gas sold for industrial purposes	2,930,000	..
Other gases, including water gas . .	33,698,000	141,786
	6,146,000	(not recorded)
Coal gas and water gas, not separately distinguished	44,000	188
Total gas made	276,406,000	..

The total production of gas in the year 1907, ascertained by a similar method, was 196,287,000,000 c.ft.; this figure being inclusive of production in Ireland.

The above aggregates are inclusive of the quantities used in the works in which the gas was made, and cannot therefore be precisely related to the "selling values," which are exclusive of those quantities. In the Annual Return relating to Gas Undertakings for the year 1924, the total quantity of gas made and sold in Great Britain in that year is stated as 256,892,000,000 c.ft., for which it appears that the average selling value of all gas made in the year was roughly 3s. 7d. per 1000 c.ft. The total quantities of gas made and sold in Great Britain alone in 1907 was 168,630,000,000 c.ft.; and the total value was returned at £22,441,000, or about 2s. 8d. per 1000 c.ft. The increase in the average selling value of gas made in 1924 over the average value ruling in 1907 appears, therefore, to have amounted to about 35 p.ct.

The total quantity of gas manufactured in Great Britain (including that used in gas-works) is stated in the annual return to have been 275,226,000,000 c.ft. in 1924. The small difference between this aggregate and that recorded in the census returns (276,406,000,000 c.ft.) may be ascribed to the fact that the latter is inclusive of the output of a few undertakings which were not operating under statutory powers, and were accordingly not covered by the annual return, and also to the different periods of twelve months selected by some undertakings for the purposes of the two returns.*

The production of gas coke, which may be regarded as almost completely covered by the figures given in the above table, was about 6 p.ct. greater in 1924 than in 1907. In a previous issue of the "Board of Trade Journal" (Preliminary Report No. 4), the quantity of foundry coke produced in 1924 by firms operating coke ovens was shown as 12,803,000 tons, raising the approximate aggregate for coke of all kinds produced in Great Britain to 20,655,000 tons—a figure which will require to be supplemented by comparatively small amounts returned on schedules for other trades. The total production of coke in the United Kingdom in the year 1907 was estimated as 20,064,000 tons.

Tar is also produced on a large scale by proprietors of coke ovens; the total quantity returned by these firms in 1924 amounting to 500,000 tons. The total quantity of crude tar made in 1907 in the United Kingdom for sale, and not refined in the works producing it, was stated to have been 858,000 tons. Including the calculated weight of tar returned by gas undertakings in terms of gallons, the quantity of tar produced in 1924 at gas-works, and sold as such or added to stock, may be estimated at roughly 800,000 tons. The quantity of tar produced for sale as such by gas-works and coke ovens in Great Britain only in 1924 was thus 1,300,000 tons, or somewhat over 51 p.ct. more than the United Kingdom aggregate returned for 1907. In both years these amounts are exclusive of tar subjected to further treatment in the works in which it was made.

The output of residual products by gas undertakings also represents a part only of the total production of those goods which are made extensively by firms engaged in the production of foundry coke and by other firms engaged in the distillation of coal tar. An estimate of the total production of those goods will not be possible until the output of these latter firms, whose returns have been made on schedules for the chemical trades, has been ascertained.

The relationship between the volume of production by gas undertakings in Great Britain in the years 1924 and 1907 is shown in a clearer form in the following statement:

Products.	1924.	1907.	1924 as a Percentage of 1907.
	1000 C.Ft.	1000 C.Ft.	
Coal gas and water gas made . .	276,406,000	183,791,000*	154
	Tons.	Tons.	
Coke and breeze	7,852,000	7,412,000	106
Tar	800,000	635,000	126
Bye-products—			
Sulphate of ammonia	127,000	104,000	122
	Galls.	Galls.	
Benzole and toluole	1,953,000	46,000	4246
	Tons.	Tons.	
Pitch	114,000	85,000	134
Tar oil, creosote oil, and other heavy coal tar oils	Galls. 21,314,000	Galls. 7,856,000	271

* This quantity is as shown in the Annual Return relating to Gas Undertakings for the year 1907.

It is evident that the output of the gas industry, taken as a whole, in the year 1924 showed a general and substantial advance as against the year 1907. In the case of ammoniacal liquor, it will be noted from the main statement of production that the recorded output for sale in 1924 (£135,000) suggests a considerable decline from the figure for 1907, which amounted to £307,000 and a proportion of the unclassified sum of £184,000. A possible explanation of this decline may be the more extended use made in 1924 of ammoniacal

* Both the census aggregate and that recorded by the Gas Undertakings Return are exclusive of gas amounting to about 4,500,000,000 c.ft. purchased by authorized undertakings from owners of coke ovens.

liquor in the works in which it was produced for the recovery of sulphate of ammonia or other compounds.

Construction and Repair Work.

A large staff is employed by the gas industry for laying and keeping in repair street mains and connections to consumers' premises, and for carrying out the necessary work of new construction and repair to buildings and plant. All gas undertakings were required to state the value of work of these kinds carried out by their employees during the year, the value to be stated being a sum calculated to cover the wages of the persons employed in the work, the cost of materials used, and such a proportion of the general establishment charges as was fairly applicable to this part of their activities. The value of all such work was required to be given, whether charged to capital or to revenue account. Interest, sinking fund, and other loan charges were required to be excluded.

The total amounts returned in respect of this work in 1924 and 1907 are shown below:

Work Done by Employees of Gas Undertakings.	Cost of Work Carried Out.	
	1924.	1907.
	£	£
On buildings and plant	6,092,000	2,096,000
On street mains and services	8,351,000	1,078,000
Work not separately distinguished	1,000	309,000
Total value of work done	14,444,000	3,483,000

The above amounts relate exclusively to work carried out by employees of gas undertakings. The value of similar work carried out on behalf of gas undertakings by contractors has been included in the returns made by the latter on schedules for the building and contracting trades.

Net Output.

The net output of the gas undertakings covered by the foregoing statement was £29,471,000 in the year 1924; that sum representing the amount by which the total selling value of the output of gas and other products and the work done for consumers on repayment (£64,224,000) exceeded the cost of materials purchased and used (£34,753,000).

As already stated, the working staff of gas undertakings are not employed solely in the manufacture of gas, but are also employed in the construction, repair, and alteration of mains, buildings and plant, &c. As the cost of such work becomes an ultimate charge on the products sold, it is not taken into account in estimating the total output and the net output of gas undertakings during the year. The net output per person employed (excluding the cost of construction and repair work done) was £272 in 1924, compared with £207 in 1907.

Persons Employed.

The average number of persons employed during the year 1924 in connection with the gas undertakings to which the foregoing statement of output relates was 108,421, of whom 90,837 were recorded as operatives and 17,584 as management, clerical, and technical staff. In the year 1907 the number of persons employed was returned as 80,633, of whom 72,383 were wage-earners and 8250 were salaried persons.

The age and sex distribution in the two years was as follows:

Ages.	1924.			1907.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 18 years	3,859	172	4,031	2,316	11	2,327
Over 18 years.	101,940	2450	104,390	78,006	300	78,306
Total	105,799	2622	108,421	80,322	311	80,633

The highest number of operatives employed at gas-works at one time during the year 1924 was 93,665 in December, and the lowest 88,498 in June.

Power.

The capacity of engines at gas-works during the years 1924 and 1907, distinguishing the main kinds available, was as follows:

Kind of Engines.	1924.	1907.
	H.P.	H.P.
Steam engines, reciprocating	90,668	70,623
Steam turbines	21,191	1,717
Internal combustion engines.	56,422	15,360
Water power	1	158
Other power.	..	277
Total	168,282	88,135

About 26 p.ct. of the engine power available in the year 1924 was in reserve or idle.

Electric motors of a total capacity of 17,167 H.P., driven by purchased electricity, were also recorded in respect of 1924, of which about 18 p.ct. was stated to be in reserve or idle.

The capacity of the electric generators at gas-works in 1924 was as follows:

	Kilowatts.
Driven by—	
Steam engines, reciprocating	7,172
Steam turbines	1,824
Internal combustion engines	15,257
	24,253

There were available at gas-works, for use in connection with these electric generators, electric motors of a capacity of 37,741 H.P., of which 15 p.ct. was in reserve or idle during the year.

Corresponding information regarding the capacity of electric generators or electric motors, whether driven by purchased electricity or electricity generated by engines at gas-works, was not obtained in respect of the year 1907.

Summary.

In the following table some of the leading data resulting from the censuses of 1924 and 1907 are given for companies and for local authorities separately:

Products.	Companies.		Local Authorities.	
	1924.	1907.	1924.	1907.
	£	£	£	£
Output—				
Coal gas and water gas	31,368,000	14,842,000	14,796,000	7,599,000
Coke and breeze	7,503,000	2,885,000	3,653,000	1,390,000
Tar	1,475,000	354,000	952,000	292,000
Bye-products	1,835,000	1,053,000	764,000	426,000
Other products	390,000	158,000	256,000	358,000
Total value of goods made	42,571,000	19,292,000	20,421,000	10,065,000
Fitting and repairing meters, &c.	959,000	922,000	273,000	366,000
Total value of output	43,530,000	20,214,000	20,694,000	10,431,000
Cost of new construction and repair work carried out on—				
Buildings and plant	4,512,000	1,464,000	1,580,000	632,000
Street mains and services	5,899,000	697,000	2,452,000	381,000
Work not separately distinguished	1,000	167,000	..	142,000
Total cost of work done	10,412,000	2,328,000	4,032,000	1,155,000
Cost of materials used	23,929,000	9,038,000	10,824,000	4,871,000
Net output (value of output less cost of materials used)	19,601,000	11,176,000	9,870,000	5,560,000
Average number of persons employed—	Number.	Number.	Number.	Number.
Operative staff	63,076	48,006	27,761	24,377
Administrative, technical, and clerical staff	12,885	5,300	4,699	2,950
Total persons employed	75,961	53,306	32,460	27,327
Net output per head of persons employed	£ 258	£ 210	£ 304	£ 203
Capacity of engines, &c.—				
Prime movers (steam, internal combustion engines, &c.)	H.P. 114,921	H.P. 55,495	H.P. 53,361	H.P. 32,640
Electric generators	KW. 19,044	(not recorded)	KW. 5,209	(not recorded)
Electric motors—				
Driven by purchased electricity	H.P. 5,109	,,	H.P. 12,058	,,
Driven by electricity generated in own works	27,568	,,	10,173	,,

It will be observed that the relationship between the figures for companies and for local authorities shows very little change in the two years; that part of the industry which is in the hands of local authorities being in each year about one-half of that pertaining to companies. The excess of the net output per person employed by local authorities (£304) over the corresponding figure for companies (£258) is largely due to the considerably greater amount expended by the latter in "construction and repair work." The materials used in such work have been included in the general statement of "cost of materials used;" and the "net output," which represents the value of gas and other products manufactured and work done on repayment, less the total cost of all materials used, is correspondingly reduced where it has been necessary for an undertaking to expend large sums in material other than that actually required for the production of gas.

Meter Testing in Edinburgh.—Mr. William Gordon (Official Inspector) in his report for the year ended May 15 of the City of Edinburgh Gas Meter Testing Department, states that the number of meters tested and examined was 96,095, of which 844 were wet. Fees received amounted to £5343. This was an increase of 10,742 in the number of meters and £625 in fees, as compared with the previous year. There are now eight district gas meter testing stations under the jurisdiction of the Magistrates. The prolonged dispute in the coal industry created a great demand for all kinds of gas appliances; and owing to the increased consumption of gas, a considerable number of meters already installed were found to be too small, therefore necessitating their replacement by larger sizes. The utilization of gas in practically all the Government housing schemes also created a demand for gas meters. Of the meters tested in the past year, 1577 were rejected as incorrect.

GAS TESTING IN THE METROPOLIS.

London County Council Report.

Reporting upon the work carried out by inspectors during the quarter ended June 30, the Public Control Committee of the London County Council set out the following particulars with regard to the testing of the gas.

Gas Light and Coke Company.—The gas was tested on 999 occasions for calorific value (involving 1361 individual tests with the Boys non-recording calorimeter, and 273 results derived from recording instruments). These tests gave results varying between 518·5 and 484·2 with an average of 501 B.Th.U. for the quarter; the standard declared by the Company being 500 B.Th.U. per cubic foot. The pressure of the gas was tested on 1438 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure; 802 tests were made for sulphuretted hydrogen, no trace being found on any occasion; 155 tests were made for total sulphur impurities, the results being, maximum 34·4, minimum 20·2, and the average 26·4 grains per 100 c.ft. of gas.

Commercial Gas Company.—The gas was tested for calorific value on 273 occasions (involving 546 individual tests) and gave results varying between 507 and 459·1, with an average of 480·3 B.Th.U. for the quarter; the standard declared by the Company being 475 B.Th.U. per cubic foot. The pressure of the gas was tested on 546 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure; 273 tests were made for sulphuretted hydrogen, no trace being found on any occasion; 155 tests were made for total sulphur impurities, the results being, maximum 44·9, minimum 19; and the average 29·2 grains per 100 c.ft. of gas.

South Metropolitan Gas Company.—The gas was tested for calorific value on 546 occasions (involving 1092 individual tests), and gave results varying between 573·5 and 550·9, with an average of 562·1 B.Th.U. for the quarter; the standard declared by the Company being 560 B.Th.U. per cubic foot. The pressure of the gas was tested on 1092 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure; 546 tests were made for sulphuretted hydrogen, no trace being found on any occasion; 465 tests were made for total sulphur impurities, the results being, maximum 39·8, minimum 5·5, and the average 19·7 grains per 100 c.ft. of gas.

South Suburban Gas Company.—The gas was tested for calorific value on 91 occasions (involving 183 individual tests), and gave results varying between 519·4 and 478·9, with an average of 501·9 B.Th.U. for the quarter; the standard declared by the Company being 500 B.Th.U. per cubic foot. The pressure of the gas was tested on 182 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure; 91 tests were made for sulphuretted hydrogen, no trace being found on any occasion.

Wandsworth, Wimbledon, and Epsom District Gas Company.—The gas was tested for calorific value on 77 occasions (involving 155 individual tests), and gave results varying between 486·2 and 452·4, with an average of 473·1 B.Th.U. for the quarter; the standard declared by the Company being 470 B.Th.U. per cubic foot. The pressure of the gas was tested on 154 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure; 77 tests were made for sulphuretted hydrogen, no trace being found on any occasion.

TRADE NOTES.

Morris Pulley Blocks.

Messrs. Herbert Morris, Ltd., of Loughborough, have published a new booklet—entitled "The Secret"—illustrating and describing their pulley blocks.

Drakes Vertical Retorts for Harrogate.

On p. 69 of the "JOURNAL" for Oct. 5, mention was made of the fact that the Harrogate Gas Company have placed an order with Messrs. Drakes, Limited, of Halifax, for a "Drakes" vertical retort installation. The paragraph was, in error, headed "Drakes Vertical Retorts for Halifax."

CONTRACTS OPEN.

Gas Oil.

The Gas Committee of the Mansfield Corporation are inviting tenders for the supply of gas oil. [See advert. on p. 210.]

Gasholder.

Tenders for the supply of a gasholder are invited by the Lighting Department of Copenhagen. [See advert. on p. 210.]

Steel Main and Cast-Iron Bedplate.

Tenders for the above are invited by the Plymouth Gas Department. [See advert. on p. 210.]

Sturtevant Blower.

Tenders for the supply of above are invited by the Plymouth Gas Department. [See advert. on p. 210.]

Turbine.

The County Borough of Plymouth Gas Department are inviting tenders for the supply of a De Laval steam turbine. [See advert. on p. 210.]

EXTENSIONS.

Main Extensions at Stockton.

In view of anticipated main requirements during the next three years—including provision for a scheme for about 700 houses for Synthetic Ammonia and Nitrates, Ltd., Billingham—the Stockton-on-Tees Corporation are to make application to the Minister of Health for sanction to a loan of £20,000.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

There has perhaps been a little more life in some sections of the market for forward account, though the week has shown little improvement in respect of prompt trade. A fair quantity of good Durham bunker coal is reported to have been booked for delivery to coaling stations over next year, at prices slightly better than those obtainable for current shipment. Gas coal export trade remains disappointingly quiet, and, in common with other sections, is undoubtedly experiencing serious competition from Continental producers.

Wear Specials and best quality gas makes are quoted steadily at 16s.; but this can be slightly discounted for some brands for prompt orders. Second-class gas is nominally 13s. 6d. to 13s. 9d., but here again prompt cargoes can be picked up as low as 13s. Durham coking is still in very poor demand, and the general quotation of 13s. 6d. f.o.b. cannot be maintained. Unscreened bunkers are slightly harder for best qualities at 14s. 3d. to 15s. 3d., but seconds are still a weak market at 13s. 6d. nominal. Northumberland steams fail to show any improvement, and are suffering more severely than any from foreign competition. Best screened sorts are weakly quoted at 13s. 6d. to 14s. by collieries, but through second hands they are obtainable at even less than this. Their position generally is desperate.

Gas coke is in good demand, and producers ask 21s. f.o.b. for shipment; supplies being well taken for several weeks ahead.

YORKSHIRE AND LANCASHIRE.

The mildness of the weather, coupled with the rush of orders during the latter part of September, has caused domestic fuel to be in rather quiet demand during the past week. Some of the recently increased figures have not been maintained.

The majority of collieries are much inconvenienced by the lack of orders for industrial coal of all descriptions.

With the increased working hours at the pits, and the lack of export orders, stocks are accumulating. These are being offered at exceptionally low figures without finding much attraction among buyers, who still persist in believing that values will continue to descend, notwithstanding the fact that the coal is priced at many shillings below cost of production.

Gas coke is fairly easy, while furnace coke is also discounted.

There is no alteration in the export market.

The following are the Humber bunker and export prices f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 16s. 9d.; screened gas coal, 16s. 6d. to 17s.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. 6d. to 16s.; washed singles, 15s. 3d. to 15s. 6d.; washed smalls, 11s.; rough slack, 9s. 6d. to 9s. 9d.; smithy peas, 17s. to 18s. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 14s. 6d. to 15s. 6d.; screened gas coal, 14s. 6d. to 15s. 6d.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. to 15s. 6d.; washed singles, 15s. to 15s. 6d.; washed smalls, 10s. 6d. to 11s.; unwashed trebles, 15s. 9d. to 16s. 3d.; unwashed doubles, 11s. 6d. to 12s.; rough slack, 9s. 6d.; coking smalls, 9s. to 9s. 6d. per ton. Derbyshire and Nottinghamshire—Top hards, 17s. 3d. to 18s. 6d.; washed doubles, 16s. to 16s. 3d.; washed singles, 15s. 3d. to 15s. 6d.; washed smalls, 10s. 6d. to 11s.; rough slack, 9s. 3d. to 9s. 6d. per ton. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. 6d. to 15s. 3d.; gas coke, 21s. 6d. to 23s.; furnace coke, 18s. 6d. to 19s. per ton.

At the Manchester market last week Yorkshire house coal was firm and dearer, but industrial fuel was easy. The prices were: Best Lancashire house coal, 31s. to 33s.; seconds, 25s. to 26s.; common, 19s. to 21s.; kitchen, 22s. to 24s. Yorkshire best selected, 34s. to 37s.; best house, 30s. to 32s.; seconds, 19s. to 20s.; washed doubles, 13s. to 14s. 6d.; washed singles, 8s. to 9s.; rough slack, 7s. 6d. to 8s. 6d. in wagons at pit.

MIDLANDS.

Congestion of supplies remains the feature of the gas coal trade. Everywhere there are brimming stocks. The return to solar time and shorter days has, of course, increased the lighting load; but the heating and power load has not been much affected. Burdened with accumulations which seriously hamper their operations, some of the collieries are asking agents to submit best prices obtainable for quick clearance.

There is scarcely any improvement in the demand for industrial coal and coke. In some directions late prices are barely held. The closing of the Baltic trade for the season has made a difference to shipments which reacts on the inland coalfields as well as on those more immediately concerned. Hard cokes for blast-furnace service have been coming on the market in superabundance owing partly to reduced exports and partly to the withdrawal of more furnaces from commission. The demand for central heating and other domestic uses has not developed sufficiently to redress the balance, so that producers have had to make price concessions to avoid over-stocking. Business has been done at 12s. to 13s. at the ovens. Spot lots of nutty slacks have been obtainable at 5s. 6d. upwards.

In many cases collieries have not been able to enforce the higher prices for household qualities announced this month. The volume of business shows evidence of the comparatively large stocks that were laid in during the summer.

Bognor Gas and Electricity Company.—The tenders for the £15,000 additional ordinary consolidated stock "A," which Messrs. A. & W. Richards offered on behalf of the Directors of this Company, were opened on Thursday last. They amounted to a total of £33,170, ranging from £112 down to the minimum of £105 per £100; and the average price obtained for the stock was £107 18s. 6d. p.ct.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 17.

The market for tar products continues quiet.

There is not much inquiry for pitch, and the price is nominal at about 87s. 6d. per ton f.o.b. works.

Creosote is firm at 8¾d. to 9d. per gallon.

Pure benzole is 1s. 5d. to 1s. 6d. per gallon; pure toluole, about 1s. 10d. to 1s. 11d. per gallon; 95/160 solvent naphtha, 1s. 2d. to 1s. 3d. per gallon; and pyridine, 6s. to 6s. 6d. per gallon.

Tar Products in the Provinces.

Oct. 17.

The average prices of gas-works products during the week were: Gas-works tar, 61s. to 66s. Pitch—East Coast, 84s. to 85s. f.o.b. West Coast—Manchester, 79s. to 80s.; Liverpool, 82s. to 82s. 6d.; Clyde, 83s. to 84s. Benzole, 90 p.ct., North, 1s. 1d. to 1s. 2d.; crude, 65 p.ct. at 120° C., 10d. to 10½d., naked at makers' works; 50/90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 9½d. to 10d. Heavy naphtha, North, 10d. to 1s. Creosote, in bulk, North, liquid, 7½d. to 7⅝d.; salty, 7⅝d. to 7½d.; Scotland, 7½d. to 7⅝d. Heavy oils, in bulk, North, 8⅝d. to 9½d. Carbolic acid, 60 p.ct., 2s. 4d. to 2s. 5d. prompt. Naphthalene, £11 to £14; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality unsaleable.

Reduction in Price at Rhyl.—The Rhyl Urban District Council have decided to reduce the price of gas another 3d. per 1000 c.ft., making a reduction of 6d. during the past twelve months.

Newark Gas Undertaking.—The Newark-on-Trent Corporation are undertaking considerable developments of their gas supplies; an extension to the neighbouring township of Collingham forming the subject of an inquiry conducted by Mr. G. Ewart Rhodes, of the Ministry of Health, relative to an application for a loan of £10,000. Mr. F. A. West (Gas Engineer) estimated that the extensions would yield a revenue of approximately £900 a year, towards which villages to be supplied *en route* to Collingham would furnish a substantial proportion.

Canada Taking Interest in Fuel Treatmant.—After attending the League of Nations conference at Geneva as one of the Canadian Government representatives, the Hon. Chas. Stewart (Minister of Mines) will turn his attention to the progress being made in Europe in the treatment of lignite and bituminous coal for bye-products. Dr. Charles Camsell (Deputy Minister of the Department) will join Mr. Stewart, and together they will visit plants in Germany where oil is produced from coal, and will look into the work being done by the British Fuel Research Board at Greenwich, as well as visit the extensive plants in operation in England and Scotland for the treatment of coal.

New Gas Plant for Vancouver.—The British Columbia Electric Railway Company, Ltd., have announced plans for the erection of a gas plant and holder to cost $650,000. The new plant will have a capacity of 3,000,000 c.ft. of gas daily; and the holder capacity will also be 3,000,000 c.ft. The present capacity of 6,000,000 c.ft. a day is sufficient, Mr. John Keillor (the Gas Engineer) says, to meet this winter's requirements only; and the new addition will suffice until 1932. The Company are, however, making plans for a much longer period, and estimate that Greater Vancouver will require 25,000,000 c.ft. of gas daily by 1947, to meet which an ultimate expenditure of $5,600,000 will be required on plant during the next twenty years.

Town Gas Boilers (Bonecourt), Ltd., of Grosvenor Mansions, 82, Victoria Street, S.W., is the title of a new Company formed to continue the manufacture of Spencer-Bonecourt patent town gas fired boilers and water heaters. Messrs. Spencer-Bonecourt, Ltd., are continuing their present business in the manufacture of waste-heat boilers for gas-works, steel works, &c. It is important to note that the new Company, as successors to Spencer-Bonecourt, Ltd., for the manufacture and sale of town gas fired boilers and heaters will be controlled by the technical and commercial management formerly associated with this branch of the business of Spencer-Bonecourt, Ltd. Thus the staff will be one which has actually been engaged upon this work.

Gas Explosion at the Austin Motor Works.—An inquest has been held in Birmingham concerning the death of Eli Siviter, metal annealer, who was employed at the Austin Motor Works, Longbridge, Birmingham. While he was alone in the shop, an explosion occurred in a core-drying stove heated by gas. The stove was wrecked, and Siviter was dead when other workmen arrived. Mr. R. G. Marsh, Fittings Engineer to the Birmingham Gas Department, said the conditions showed that the explosion was in the left compartment of the stove; the doors of which must have been closed at the time. The main gas tap had evidently been turned on, and five of the individual burners were also turned on. The explosion was due to unburned gas igniting by external or internal means. It might be that Siviter turned on the gas in one compartment without lighting it, and then opened the door of the other compartment to light the burners there, forgetting his omission. Again, he might have turned on the gas in the left-hand compartment, and omitted to light one of the burners he had turned on, closing the doors again before devoting himself to the right-hand compartment. The jury returned a verdict of "Accidental death."

Danish Gas Company.

At the annual meeting of the Company, to be held in Copenhagen on Nov. 1, the Directors will report that the accounts for the year ended June 30 show that the balance standing to the credit of the profit and loss account, after charging interest and pensions, is Kr. 631,161 09. Out of this sum the Directors recommend that a dividend of 6 p.ct. on the ordinary shares, or Kr. 10 80 per share, be declared. This will leave Kr. 290,961 09 to be carried forward. The result of the year's operations of the Company's works has been on the whole satisfactory, and shows an increase in revenue of Kr. 86,051 72. The coal strike in England caused a very considerable loss of revenue, especially at the Odense Works, where inferior coal had to be purchased at a greatly enhanced price, and without a proportional increase in the price of gas. It is, however, notable that, in spite of a loss being made in the two quarters affected by the strike, the year's working has shown an increase of revenue of nearly Kr. 100,000 as compared with last year. The water-works at Tikjob and the gas-works at Ribnitz have shown a small profit. There has been a further capital expenditure of Kr. 103,715 16 for additional plant, mains, meters, &c., during the past year. All extension work and repairs have been completed, and the works are prepared to meet the demands of the coming winter. The quantity of gas sold during the past year has been 319,848,000 English c.ft., against 307,860,000 English c.ft. in the previous year—being an increase of 11,988,000 English c.ft., or 3·9 p.ct. The claim for further compensation on account of the Flensburg Gas-Works is still being prosecuted through diplomatic channels. The Directors have declined to accept the result of the over-valuation of the Frederiksberg Gas-Works; and the question is now before the Courts of Justice.

National Institute of Industrial Psychology.—An investigation by the Institute has now been in progress at the works of the South Metropolitan Gas Company for nearly three years. At a recent meeting of the Board of the Company, it was decided to extend the investigation for a further period of five years.

Interference with Gas Connections.—A report was submitted to the Stockton-on-Tees Gas Committee with regard to a householder who was stated to have disconnected the meter, the service pipe and the house pipe being joined by rubber tubing. The Gas Manager (Mr. W. W. Atley) was instructed to report to the next meeting on a method of preventing interference with gas connections.

Mr. Jas. E. Davis, a meter inspector of the Belfast Gas Department, has retired after fifty years' service with the Department.

The Kilsyth Town Council have decided to do away with the charge for the hire of gas cookers, in order to increase the demand for gas for cooking purposes.

Mr. Fielden Holt, of Todmorden, late Chairman of the Holyhead and North Wales Gas and Water Corporation, left estate of the gross value of £38,702, with net personalty £30,491.

Evan Davies, a labourer, and his wife, living in Powell Street, Swansea, were found in their bedroom gassed. The woman was dead, and her husband unconscious. No gas taps were turned on in the house; and it is supposed there was an escape from the main, caused by heavy traffic passing over the roadway at the front of the house.

Failures of electricity supply, owing to faults of one kind or another, have lately been very frequent in various parts of West Yorkshire; and they usually occur at the time of heaviest load, shops being left without a light at a busy period. The most recent was at Thorne, near Doncaster, last week, where shops and a local cinema suffered considerable financial loss.

Of the meters tested at the London County Council's stations during the quarter ended June 30, 78,677 were stamped and 14,668 rejected. Of those tested *in situ*, 14 were stamped and none rejected. The total income from fees received for the testing of gas meters amounted to £6069. As compared with the corresponding quarter of 1926, there was an increase of 22,256 meters tested and £1553 in the amount of fees received.

Recommending to the Stockton-on-Tees Gas Committee that cookery demonstrations should be held early next year, the Manager (Mr. W. W. Atley) pointed out that similar demonstrations in March, 1926, were the means of obtaining numerous orders for cookers, in addition to educating housewives in the correct use of gas. Three cooker manufacturing firms had offered to supply apparatus, lectures, and advertising matter. The Committee authorized the Manager to proceed with the arrangements, subject to the Corporation being responsible only for the cost of renting the borough hall and of the gas used.

The Birmingham Corporation Gas Department, in sending out their quarterly accounts, direct the attention of consumers to the value of gas coke for domestic purposes. Mr. A. W. Smith (the General Manager) points out, in a circular-letter, that delivery is made in quantities from two bags upwards. He adds: To those who have not had experience in the use of this economical, smokeless fuel, I would explain that all the coke produced is carefully prepared and sized for the various uses for which it is sold. For ranges, open fires, hot water circulators, and greenhouse boilers, small coke should be asked for; while for anthracite or closed heating stoves, 1-in. nuts will be found the most suitable and satisfactory.

STOCK MARKET REPORT.

WHILE a large business was done on the Stock Exchange last week, an irregular tendency developed in some directions. The easy monetary conditions and a growing confidence in the maintenance of the present Bank Rate were responsible for an increased demand for high-class securities.

The reverse of the picture was in the Industrial Market. The many warnings with regard to the price of British Celanese ordinary shares had effect; and it was evident that confidence had received a severe check. The market was disappointed also with the interim dividend announcement of the Imperial Chemical Company; but the known strength of the combine prevented any material fall.

The Gas Market, notwithstanding the close holding of the various stocks, was quite buoyant. It was rumoured that the sales of gas of the Gas Light Company are showing a higher percentage of increase than has been usual in the past few years, and that such improvement prevails in many other companies.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr	NAME.	Quotations. Oct. 14.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Sept 8	5	5	Aldershot 5 p.c. max. C.	£8—13		
238,992	,,	,,	6	4	Do. 4 p.c. Pref.	67—70	..	..
1,567,866	,,	Sept 9	7	7	Alliance & Dublin Ord.	84—87	..	..
274,000	,,	July 14	4	4	Do. 4 p.c. Deb.	64—67	+1	85—87
522,654	,,	Aug. 15	—	7	Barnet Ord. 7 p.c.	103—105	..	..
800,000	1	Oct 13	1/7½	1/7½	Bombay, Ltd.	21/—23/-	+1	103½—103⅝
170,000	10	Aug 25	8½	8½	Bournemouth 5 p.c.	12½—13½	—/6	21/6—22/-
500,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	10⅝—11½	..	12½—12⅝
50,000	Stk.	June 29	3	3	Do. 3 p.c. Deb.	55—58	..	..
163,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
357,900	,,	Aug. 25	—	7½	Brighton & Hove 6 p.c. Con.	103—106	..	..
341,800	,,	,,	—	6/8/6½	Do. 5 p.c. Con.	92—95	+1	104—104⅞
1,387,500	,,	July 28	5	5	Bristol 5 p.c. max.	85½—86½a	..	93½—94
885,000	,,	Sept 29	7	8	British Ord.	108—111	+½	..
100,000	,,	June 29	7	7	Do. 7 p.c. Pref.	114—117	+1	109—109½
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	74—77	..	116½
200,000	,,	,,	—	33/2	Do. 5 p.c. Red. Deb.	94—96	..	..
100,000	10	May 26	6	8	Cape Town, Ltd.	7½—8½	..	95
150,000	Stk.	June 29	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
886,800	,,	July 28	4½	4½	Do. 4½ p.c. Deb.	70—75	..	..
337,860	,,	June 29	6	6	Cardiff Con. Ord.	100—103	..	..
157,150	,,	Aug. 11	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	..
79,186	1	Oct. 15	6½	5	Chester 5 p.c. Ord.	87—92b	..	..
34,495	1	,,	†2/-	†2/-	Colombo Ltd. Ord.	28/—30/.*	-1/-	..
321,490	1	Oct. 13	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/.*	-1/-	..
173,900	1	,,	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/—26/.*	..	..
3,073,280	Stk.	July 14	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/.*	-1/-	..
475,000	,,	June 16	—	5	Commercial Ord.	88—90	..	..
800,000	,,	Sept. 29	8	8	Do 8 p.c. Deb.	55—58	..	88½—90
300,000	,,	,,	†1	†1	Continental Union, Ltd.	30—35	..	..
787,560	,,	Aug. 11	7	7	Do. 7 p.c. Pref.	82—84	..	30½
400,100	,,	,,	6½	6½	Croydon sliding scale	97—100	..	..
492,370	,,	Aug. 25	5	5	Do. max. div.	80—88	..	..
55,000	,,	June 29	9	6	Derby Con.	103—105a	+3	89½
300,000	,,	Aug. 25	4	4	Do. Deb.	78—75c	..	..
50,000	,,	June 16	5	5	East Hull Ord. 5 p.c.	78—81	..	..
1,002,180	10	Sept. 29	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
18,747,450	Stk.	July 28	†3	†4	European, Ltd.	6½—6⅝	..	..
3,600,000	,,	,,	5	5	Gas Light & Coke 4 p.c. Ord.	90—92	+1	6 7/16—6½
4,197,020	,,	,,	3½	3½	Do. 8½ p.c. max.	60—62	..	90—91½
4,603,630	,,	,,	4	4	Do. 4 p.c. Con. Pref.	75—77	+½	60½—61½
181,315	,,	June 16	3	3	Do. 3 p.c. Con. Deb.	58—60	..	75½—77
1,642,770	,,	,,	6	6	Do. 6 p.c. Br'lf'd Rd. Db.	102—105	..	59⅜—60⅜
49,080	,,	,,	5	5	Do. 5 p.c. Red. Deb.	99—101	..	..
93,500	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	100½—100⅝
352,740	,,	Aug. 25	6½	6½	Hastings & St L. 5 p.c. Conv	88—91	..	..
70,000	,,	,,	5½	5½	Do. 5½ p.c. Conv.	89—92	..	..
172,300	10	Oct. 13	†10	†10	Hongkong & China, Ltd.	69—72	..	..
1,976,000	Stk.	Aug. 25	5	5	Hornsey Con. 8½ p.c.	12—18*	..	..
393,130	,,	May 12	10	10	Imperial Continental Cap.	65—68	..	..
386,942	,,	Aug. 11	8½	8½	Do. 8½ p.c. Red. Deb.	142—145	..	..
2,145,907	,,	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord.	68—70	+2	142—145
600,000	,,	Aug. 11	5½	5½	Liverpool 5 p.c. Ord.	94—97	..	..
165,736	,,	Sept. 29	7	7	Do. 7 p.c. Red. Pref.	85½—86⅜b	..	95½—96½
69,480	,,	Aug. 25	8	9	Maidstone 5 p.c. Cap.	101—103b	+⅛	..
75,000	,,	June 16	3	3	Do. 3 p.c. Deb.	107—112	..	..
541,930	5	June 16	†7	†8	Malta & Mediterranean	52—55	..	..
2,051,315	Stk.	May 26	†5	†7	Montevideo, Ltd.	5½—6⅜	..	..
360,939	,,	July 28	5	5	Newcastle & Gateshead Con.	91—93	..	..
891,705	,,	,,	4	4	Do. 4 p.c. Pref.	76½—77½d	+½	92
131,785	,,	June 21	3½	3½	Do. 3½ p.c. Deb.	69½—70½d	..	..
300,000	,,	Aug 25	—	6/18/0	North Middlesex 6 p.c. Con.	66½—67½d	..	..
188,120	,,	Apl. 28	9	7	Oriental, Ltd.	93—96	..	..
414,500	,,	June 21	7½	7½	Plym'th & Ston'house 5 p.c.	100—102	..	..
326,732	,,	Aug. 25	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	102—107	..	100⅜—102
2,389,909	,,	—	5	5	Do. 5 p.c. max.	102—105	..	..
389,200	,,	—	—	—	Primitiva Ord.	76—79	..	..
800,000	100	June 1	4	4	Do. 4 p.c. Red. Deb.	18/—19/-	+·/6	17/9—19/-
434,982	Stk.	July 28	4	4	Do. 4 p.c. Red. Deb. 1911	84—86	..	..
180,000	,,	June 29	—	4	Do. 4 p.c. Cons. Deb.	72—74	..	74
135,000	10	Sept. 29	6	6	San Paulo 6 p.c. Pref.	72—74	..	73½
276,000	50	June 29	5	5	Do. 5 p.c. Red. Deb.	72—81*	..	..
419,968	Stk.	Sept. 8	5½	5½	Sheffield A	47—49	+½	..
1,047,000	,,	,,	5½	5½	Do. B	99¼—100¼c*	..	..
90,000	,,	,,	5½	5½	Do. C	99¼—100¼c*	..	..
6,609,895	10	May 26	4	6	South African	99¼—100¼c*	..	..
500,000	Stk.	Aug. 11	7	5	South Met. Ord.	4—6	..	..
1,895,445	,,	—	—	—	Do. 6 p.c. Irred. Pf.	102—104	..	..
734,000	,,	July 14	8	8	Do. 8 p.c. Deb.	110—113	..	102½—103
91,500	,,	Sept. 8	6½	6½	Do. 6½ p.c. Red. Db.	87—60	..	112½
1,343,795	,,	Aug. 11	8½	8½	South Shields Con.	101—103	..	59½
368,837	,,	July 28	6½	6½	South Suburban Ord. 5 p.c.	101—103d	..	102—103
647,740	,,	June 16	5	5	Do. 5 p.c. Deb.	102—105	..	..
191,275	,,	Sept. 8	5	5	South'mpton Ord. 5 p.c.max.	93—96	..	103¾—104½
250,000	,,	June 29	4	4	Do. 4 p.c. Deb.	78—78	..	94½
200,000	,,	Aug. 25	7	7	Swansea 7 p.c. Red. Pref.	72—76	..	76½—77½
150,000	,,	June 16	6½	6½	Do. 6½ p.c. Red. Deb.	78—76	..	..
662,278	,,	July 28	7½	7½	Tottenham District A 5 p.c.	100—102	..	..
150,000	,,	,,	6½	6½	Do. B 3½ p.c.	100—102	..	..
181,255	,,	,,	5½	5½	Do. 5½ p.c. Pref.	105—108	..	..
258,251	,,	June 16	4	4	Do. 4 p.c. Deb.	89—92	..	..
	,,	Sept. 29	5	5	Tynemouth Con. and New	95—98	..	..
283,094					Uxbridge, Maidenhead, &	72—75	..	..
66,880	,,	Aug 25	6½	6½	Wycombe 5 p.c.	81—83d	..	72
	,,	,,	5	5	Do. 5 p.c. pref.	85—90	..	..
					Wandsworth, Wimbledon, and Epsom—	83—88	..	87
80,000	,,	July 14	8½	8½	Wandsworth A 5 p.c.	117—122	..	..
256,686	,,	,,	7	7	Do. B 3½ p.c.	100—105	..	..
422,535	,,	,,	5/19/0	5/19/0	Do. C and New	88—93	..	..
869,000	,,	,,	6½	6½	Do. Wimbledon 5 p.c.	98—103	..	..
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c.	100—105	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	85—90	..	..
86,416	,,	June 29	8	8	Do. 8 p.c. Deb.	55—58	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.

It will be seen from the Table that all the variations in the quotations, other than *ex* div. quotations, were in an upward direction. The greatest improvement was the rise of 3 points in the Croydon max. dividend stock to 80-83. The yield on this stock, calculated on the average price, is £6 2s. 8d. p.c. per annum. Of the companies operating abroad, Primitiva shares registered a further advance of 6d. to 18s.-19s., and there were several sales at the higher figure. The continued interest in these shares seems to indicate a dividend distribution in the near future.

The following transactions were recorded:

On Monday, Commercial 89, Continental Union 30¼, European 6½, Gas Light and Coke 90¼, 90⅜, 91, 3½ p.c. maximum 61, 61¼, 4 p.c. preference 75⅝, 76½, 77, 3 p.c. debenture 60, 5 p.c. debenture 100½, Imperial Continental 142, Lea Bridge 5 p.c. 95½, Primitiva 17s. 9d., 17s. 10½d., 18s. 1½d., 4 p.c. consolidated debenture 73½, 4 p.c. debenture (1911) 74, South Metropolitan 102½, 102⅝, 102¾, 3 p.c. debenture 59½, 6½ p.c. debenture 102, 103, Southampton 5 p.c. 76½. Supplementary prices, Tottenham 5 p.c. preference 86.

On Tuesday, Alliance and Dublin 85, 86, Brighton and Hove 6 p.c. 104, 104⅝, British 109, 5 p.c. debenture 95, Commercial 88½, 89, Gas Light and Coke 90, 90⅛, 90⅜, 90⅝, 91, 3½ p.c. maximum 61, 3 p.c. debenture 60⅜, 5 p.c. debenture 100¼, Imperial Continental 143, Lea Bridge 5 p.c. 96½, Primitiva 17s. 9d., 17s. 10½d., 18s., 18s. 1½d., South Metropolitan 102½, 6 p.c. preference 112½, South Suburban 5 p.c. 103½, Southampton 5 p.c. 77½. Supplementary prices, Croydon 6 p.c. debenture 102.

On Wednesday, Alliance and Dublin 87, Bournemouth "B" 12½, British 109½, 7 p.c. preference 116½, Commercial 89½, 89⅜, 90, Gas Light and Coke 90½, 90⅜, 90⅛, 90⅜, 91, 3½ p.c. maximum 61, 61½, 61⅛, 61⅜, 4 p.c. preference 76½, 5 p.c. debenture 100⅜, 100½, Imperial Continental 142½, Primitiva 17s. 10½d., 18s., 18s. 1½d., South Metropolitan 102½, 6½ p.c. debenture 102½. Supplementary prices, Danish 8½, Herne Bay 6½ p.c. preference 5½, Wakefield 5 p.c. maximum 71, 5 p.c. standard 81½.

On Thursday, Barnet 7 p.c. 103½, Bombay 21s. 6d., 22s. *ex* div., Brighton and Hove 5 p.c. 94, Commercial 90, European 6 7/16, 6½, Gas Light and Coke 90½, 90⅝, 90⅜, 91⅛, 91½, 3½ p.c. 60½, 4 p.c. preference 76, 5 p.c. debenture 100⅜, Imperial Continental 142½, 143, 145, Newcastle and Gateshead 3½ p.c. 74½, Oriental 100⅜, 101, 102, Primitiva 17s. 9d., 17s. 10½d., 18s., 18s. 1½d., 18s. 3d., South Metropolitan 102½, 102⅝, 103, 103¼, 6½ p.c. debenture 102½, South Suburban 5 p.c. 103½, 104, 5 p.c. debenture 94½. Supplementary prices, Bath 5 p.c. debenture 95½, Brighton and Hove 6 p.c. "D" preference 100, 5 p.c. debenture 95, Croydon 7½ p.c. preference 104½, Wakefield 5 p.c. maximum 71½, 5 p.c. standard 82.

On Friday, Barnet 7 p.c. maximum 103½, Bournemouth "B" 12¼, Brighton and Hove 5 p.c. 93½, Croydon maximum dividend 82½, European 6 7/16, Gas Light and Coke 90½, 91⅛, 91¼, 91⅛, 4 p.c. preference 76, 3 p.c. debenture 59⅜, 5 p.c. debenture 100½, Imperial Continental 143, 143½, 144, 145, Montevideo 92, Primitiva 18s., 18s. 1½d., 18s. 3d., 18s. 4½d., 18s. 5½d., 18s. 6d., 18s. 7½d., 18s. 9d., 19s., South Metropolitan 102¾, 102½, 102¾, 103, South Suburban 5 p.c. 104½, Tottenham 4 p.c. debenture 72, Uxbridge 5 p.c. 87. Supplementary prices, Hampton Court 5 p.c. 102, Montevideo 5 p.c. debenture 90½, North Middlesex 5 p.c. preference 82½.

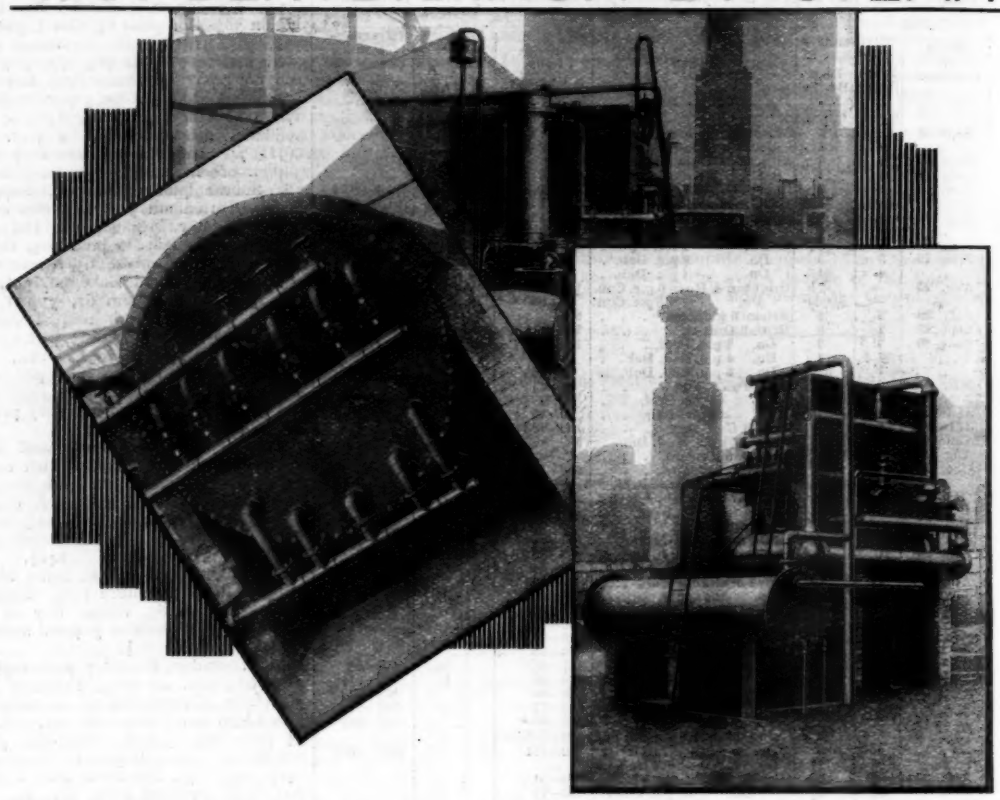
The pronounced strength of sterling continued the outstanding feature of the Money Market. At the close of the week in Lombard Street there were ample supplies of loanable credit, and the rate for new money speedily dropped to 3 p.c., with a small percentage above for renewals. Treasury Bills were allotted at a slightly lower rate than the previous week. The average rate was £4 6s. 4·73d. p.c.

In the Foreign Exchange Market, the business was mostly in Spanish pesetas. Holland and America were sellers of this currency, and the Madrid rate closed at 28.52½—a rise of 22c. Dutch florins appreciated to 12.11⅜. Francs were slightly higher at 124 7/16, and Italian lire dearer at 89.10.

Silver was firm, the price rising 1/16d. to 25½d. per oz. Gold remained at 84s. 11½d.

The Bank Rate is 4½ p.c., to which it was reduced from 5 p.c. on April 21. The Banks' deposit rate is 2½ p.c., and the deposit rates of the discount houses are 2⅜ and 2¾ p.c.

TAR DEHYDRATION BY STEAM



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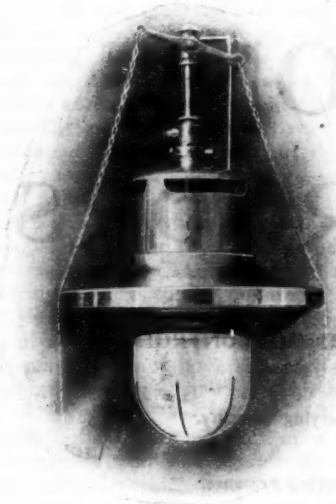

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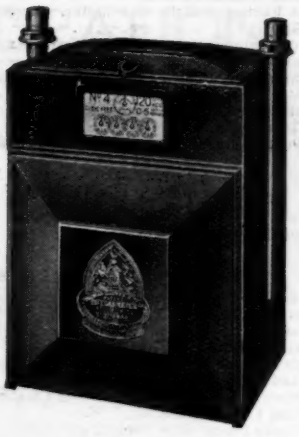

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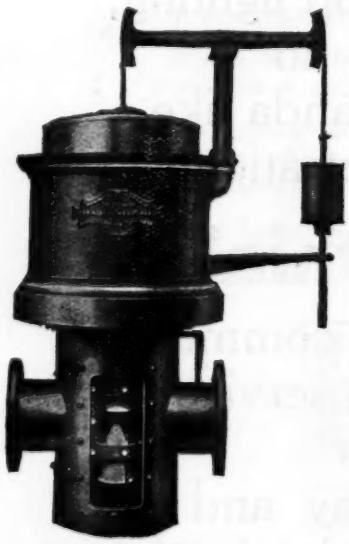

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